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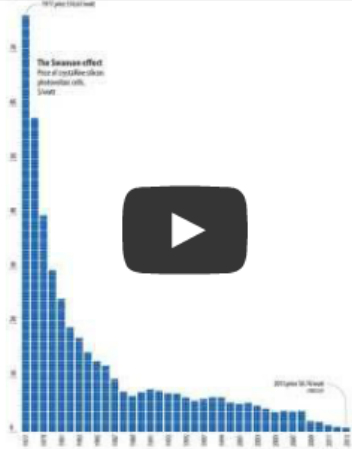


# Solar IQ Rises As Costs Fall

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Cost Of Solar Has Dropped Tremendously, Great I...



The Inverse effect: Rise of rooftop solar photovoltaic cells. Source: [unclear]

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By Stacy Clark

House by house, street by street, homeowners and businesses are increasingly **divesting** from conventional electrical power providers and going solar. "About 200,000 US homes and businesses added rooftop solar in the past two years alone—about 3 gigawatts (GW) of power and enough to replace four or five conventionally sized coal plants," according to **Bloomberg** news.

Energy leaders like **Andrew Birch**, a former business development executive for BP Solar, see this shift to **distributed power** as a positive indication that clean energy is finally gaining traction in America. "This rooftop solar movement is the result of a handful of like-minded leaders who are banding together to expand the nation's energy options," Birch said in a recent interview.

One very hot segment of the rooftop solar market is third-party leasing and PPAs. While many people decide to purchase their systems for the financial benefits that come with ownership, and there are even **\$0 down solar loans available nationwide** to help with that, in markets where solar leasing is an option, it is widely preferred. In California, around **75% of new solar homeowners are getting solar leases**.

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**Michael Gorton**, CEO of Dallas-based **Principal Solar**, explains the rapid evolution of the industry: "In five years, solar has lost 80 percent of its cost and in many states, solar is increasingly achieving grid parity." Even conventional energy guru, Hunter L. Hunt, grandson of legendary wildcatter H.L. Hunt (1889-1974), appears to have conceded to the fact that solar is becoming a viable source of energy for the US by becoming a Principal Solar Board member.

In the case of third-party solar leases, once installed, the rooftop solar panels deliver on average 10-15% cost savings and a whopping 80-85% reduction in carbon emissions. With no money down, such market-based solutions mean that clean power is now accessible to nearly anyone who wants it.

Speaking last year at a Chicago climate conference, Al Gore enthusiastically endorsed the third-party solar model, **stating** that it is "changing the way that clean electricity is made in America and around the world."

## Rapid Growth

According to Jonathan Bass, Communications Director for **SolarCity**—one of the nation's leading third-party solar leasing operations, based in San Mateo, CA—SolarCity's stock quadrupled following its IPO in December 2012. "Not only have we seen over 13 percent growth in the last two years, but we've hired what amounts to one new employee every day for six years." This is impressive given that SolarCity was founded just 18 months before the 2008 Recession.

**Sungevity** is another rising star in the solar leasing space, and its success is turning heads in Silicon Valley and on Wall Street. Andrew Birch is now Sungevity's CEO and Market Leader. His partner, **Danny Kennedy**, author of ***Rooftop Revolution: How Solar Power Can Save Our Economy—and Our Planet—from Dirty Energy***, is Sungevity's Mission Leader. Together, they are the public face of the still private company.

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Sungevity's Danny Kennedy and Andrew Birch

"Here in Oakland, CA, where we're headquartered, we've created the biggest network of energized customers," Kennedy said. "Our business has experienced phenomenal growth, from four employees servicing the San Francisco Bay Area to over 400 people servicing a global marketplace. Though this community was hard hit by the last economic collapse, the city has benefited by the jobs we've built here, and we're helping to establish the region as the clean-tech corridor by incubating other solar start-ups."

Kennedy is referring to Sungevity's founding sponsorship of the [SFUNcube](#), the world's foremost solar incubator. Its purpose aligns with Sungevity's vision – Solar For Universal Need, hence the origin of its name. [Mosaic](#), Billy Parish and Daniels Rosen's crowdfunding startup, is now the leading online marketplace for connecting individual investors to profitable solar investments and was spawned from an early iteration of the SFUN cube.

## Will Solar Displace Fossil Fuels?

There are [23,000 terawatts of solar power](#) landing on earth, which is about 1,400 times more than we need to power our global needs. The rapid price drop in solar panels over the

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past decade means that harvesting an abundance of sustainable energy is becoming more affordable. In emerging nations, like [Peru](#) and [Zambia](#), solar power is connecting long-impooverished families to electricity for the first time because it is now an accessible and affordable source of energy.

It is the same appeal that has driven more Americans to choose solar power for their homes and businesses, and the environmental benefits are compelling too. As awareness of the link between the [empirical data](#) linking carbon-based power to a [dangerously warming planet](#) grows, American consumers are increasingly connecting their energy footprint to the fate of the planet. What has pleased environmentalists, of course, is that with growing awareness comes consumer action.

And yet, despite solar power's meteoric rise, billions of dollars in taxpayer subsidies continue to finance the fossil fuel industry's model of extreme energy extraction. [Earth Track](#), an NGO specializing in subsidy valuation, estimates that annual subsidies supporting the coal, natural gas and oil industries (legacy fuels) are as high as [\\$52 billion](#). The irony of course is that taxpayers are rewarding fossil fuel companies for an energy model that is heating the planet at [breakneck speed](#), as well as causing tremendous health problems and even death. A study led by the then-director of the Harvard Medical School Center for Health and the Global Environment, Dr. Paul Epstein, found that [coal production costs the US \\$500 billion a year](#) in health and environmental costs not accounted for in the price.

At a distance, there's a proverbial arm-wrestling match taking place in all 50 states. You have powerful oil, coal, and natural gas on one side, and the leaner cleaner renewable energy industry on the other. It's likely that both will continue to succeed for some time. But as we need to correct our current trajectory with regard to planetary heating, how exactly will this variable impact the market and the future of both industries?

## Market Pragmatism

In his June 20, 2013 [Huffington Post](#) article, [Bevis Longstreth](#), former SEC Commissioner and former Chairman (and current member) of the [Rockefeller Family Fund](#) Finance Committee, predicted that there will be a mass exodus out of fossil fuel stocks and into distributed clean energy investments when enough people acknowledge that our nation's dominant energy model is broken.

"For investors, particularly institutional investors required to act as fiduciaries with informed care and caution, the present state of the planet in regard to climate change poses serious portfolio risks that grow daily," Longstreth writes. "An informed market will discover the stock prices of extractive industry companies to be vastly overpriced. A correction will occur, one that smart fiduciaries will want to get ahead of."

Longstreth's warning involves the fossil fuel industry's vast [remaining carbon reserves](#), which include 1.1 trillion barrels of oil, 909 billion tons of coal, and 6,182 trillion cubic feet of natural gas.

Bill McKibben's 350.org "[Do the Math Tour](#)," campaign to move away from carbon-based energy, calculates that burning these reserves would emit 2,795 gigatons of carbon dioxide into the atmosphere, which is estimated by climate experts to be five times the safe amount. [James Hansen](#), one of these experts—the former lead climate scientist at NASA and now a highly distinguished environmental activist—[wrote](#) in September that "burning all fossil fuels [remaining in the ground] would produce a different, practically uninhabitable planet."

Longstreth predicts that the \$4 trillion market value of fossil fuel companies will fall by 40% to 60% when investors finally connect these all-important carbon dots.

The truth is that the smartest scientists in the world agree that we can't possibly survive and burn all the carbon that the planet holds. Even the fossil fuel industry's masterful ad campaigns boasting panoramic blue skies, white-picket fences, and small-town values can't conceal the reality that our planet is under catastrophic stress from carbon and that even the finest cinematic effects can't expand the atmosphere to absorb it.

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## Grassroots Campaigning

What largely unites advocates of solar power and other renewable energy technologies is the unsustainable societal costs of the fossil fuel industry. Natural gas fracking operations, oil exploration and transportation, and the mining and burning of coal have degraded air, water, and land quality worldwide.

New York-based Mark Ruffalo, the actor turned anti-fracking activist, has spent the last few years inspiring communities to consider the benefits of clean energy. His [powerful stories](#) of polluted waterways and landscapes near his upstate NY home engage audiences to think about where their electricity comes from and the power they possess as consumers to change the way energy is made in America. Ruffalo's bet is that voters will persuade politicians to support clean energy investment and put an end to fossil fuel subsidies.

Ruffalo's presentations include clips from Josh Fox's [award-winning documentary](#) *Gasland*, which chronicles the first-hand accounts of people living adjacent to natural gas fracking sites. Fox's images of flammable tap water, brown skylines, and altered landscapes convey the negligence of the natural gas industry and underscore the major cause of global warming—the continued and largely unsupervised excavation and combustion of all fossil fuels to produce electricity, heat homes, and drive automobiles.



Josh Fox observes natural gas fracking operation in his movie, *Gasland*

Fortunately, Ruffalo's efforts have paid off and now several states, including New York, have issued [moratoriums](#) on fracking. Ruffalo hopes that more leaders will conclude that the process of injecting highly toxic chemicals into the ground under pressure to release natural gas is an experiment gone badly wrong. In speaking with politicians face-to-face, Ruffalo emphasizes that the environmental and human health costs of extreme energy extraction are too high and that consumers need a choice.



Mark Ruffalo speaking at a Nantucket Island conference

Ruffalo's ongoing outreach is part of a national movement to transition America to [cleaner energy sources](#). A parallel effort, the nascent [fossil fuel divestment campaign](#) calls on university endowments, pension funds, religious institutions, and individuals to divest from legacy fuels. The goal is to reduce the political influence of fossil fuel corporations to allow space for climate legislation that promotes clean energy.

[Divest Harvard](#) co-coordinator and Harvard Junior, [Chloe Maxmin](#), explained in a recent interview: "Our goal is to ensure that the money invested [by colleges and universities] is not threatening our future."

Maxmin draws a clear connection between environmental awareness and other social movements: "In the case of Harvard, there is a long history of investments sending a message in support of social justice and we are working hard to ensure that the same will be true for climate change."

[GoFossilFree.org](#), Maxmin explains, "reaches beyond campuses to business and institutions, encouraging corporate leaders to align their cultural values with their investments."



Divest Harvard's Chloe Maxmin

## The Solutions Project

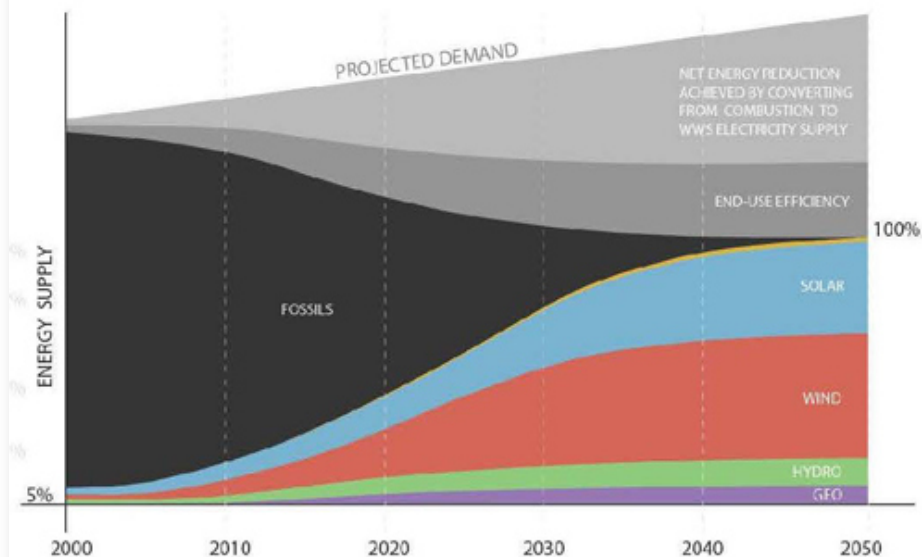
Is clean energy capable of meeting the demands of a growing nation that appears to be increasingly willing to move away from the energy-as-usual model? One very well organized team of experts and well-informed activists is determined to prove it can.

[The Solutions Project](#), a partnership of global game-changing business, science, and cultural leaders, aims to be the nexus of the ongoing American transition to renewable energy.

The team's science leader is [Mark Z. Jacobson](#), Stanford University's Director of the Energy & Atmosphere Program. Jacobson incorporates the [external costs of fossil fuels](#) in his mathematical modeling, including information from the [National Academy of Sciences 2009 report](#), which estimates that burning fossil fuels results in approximately \$120 billion per year in health-related costs. By applying society's expenses to the economic analysis of legacy fuels, Jacobson documents that the upfront infrastructure costs of a clean energy economy are no longer prohibitive. "When the external costs of fossil fuels are factored in, solar power is already [more affordable](#) than traditional coal-fired and natural gas-fired electrical power generation."

As a result, Jacobson has created a "50 State Strategy" for converting community power supplies to clean energy and recently discussed the findings with [David Letterman](#). The 50

State Plan is designed to produce 80-85% of the electricity required by the US with renewable sources by 2030 and 100% by 2050, as shown in the graph below.



Jacobson also emphasized his [team's initial work in New York](#), which has made headlines and attracted the interest of major politicians, including Republicans, Democrats, and Libertarians. [The New York plan](#) calls for transitioning the state's electrical power production to 100% renewables using a strategic mix of wind, solar, and geothermal electrical power.



Mark Z. Jacobson discusses The Solutions Project with David Letterman  
Image Courtesy The Solutions Project

The team's business leader is [Marco Krapels](#), a successful clean energy financier with Pegasus Capital Advisors and a self-confessed solar evangelist. He believes that the market-based solutions already underway will accelerate America's shift to renewable energy.

"Whether it's the competitive cost of renewable energy, the environmental benefits it delivers, or the fact that it makes homes, schools, and businesses independent power producers, access to affordable clean electricity is the big technology breakthrough of this century," Krapels commented by phone.

The Solution Project's cultural leaders are Ruffalo and Fox. In partnership with Jacobson and Krapels, the four pioneers have devised a prudent clean energy model that is endorsed by influential business and science leaders. Among the Project's many supporters and advisors are Bill McKibben, Danny Kennedy, Billy Parish, Elon Musk, Facebook's Bill Weihl, Google's Rick Needham, Robert Redford, Leonardo DiCaprio, and Leilani Munter. Individually and collectively, these trailblazers are pushing the Project's agenda on many fronts. In Munter's interview with Eco-Chick, the American racecar driver sported a [350.org](#) jacket emblazoned

with her own website, [carbonfreegirl.com](http://carbonfreegirl.com), which promotes—among many things—environmental—solar energy, electric cars, and the cleantech transformation of the industry that made her famous.



Famed racecar driver Leilani Münter

By leveraging their own experience in business, science, and culture, The Solutions Project team has, in a very short time, become a powerful coalition of public icons who will “educate and engage a massive audience,” according to their COO, Jon Wank.

It would appear that research and technology are trending. Science and math are in demand. To reinvent the American economy and repair the American landscape, affective political leaders will need to embrace all four.





## Solar Rising

Gorton believes that solar companies will continue to stabilize the cost of electricity and thereby substantially impact job growth. "We are indirectly creating new jobs by lowering electricity costs over time... this enables people to hire more and invest in innovation," he said. [Andrea Luecke](#), Executive Director of [The Solar Foundation](#), confirms Gorton's analysis. "Texas solar businesses now employ more people than ranching," Luecke reported in a recent email. "In California, the number of solar innovators surpasses actors, and in New York, solar employment has already outpaced the number of subway operators."

### Solar Worker Highlights



Image Courtesy The Solar Foundation

Beyond these impressive stats, [Emily Hois](#) reported in June that [portable solar generators](#), provided by [Solar One](#), helped to restore power to residents and businesses when Hurricane Sandy slammed the northeast, proving once again that communities benefit from distributed (non-centralized) power systems in myriad ways.

Krapels is optimistic: "We are headed for an acceleration of the inevitable transition to clean energy because it will continue to be cheaper than fossil fuels."

So, the dawn of clean energy has arrived and its outlook is bright. In fact, one of the only remaining hurdles, in addition to the political might of the fossil fuel industry, is how to efficiently store all this captured, free energy. Breakthroughs in battery technology are in the works, and SolarCity, in partnership with [Tesla Motors](#), will launch its [battery storage solution](#) in 2015. The project will enable customers to use excess solar power from their rooftops as a backup source of energy during emergencies.

Larger-scale battery storage for renewable energy is also underway. Harvard professor [Michael Aziz](#) and his colleagues have designed a rechargeable flow battery using cheaper and safer materials. Flow batteries store energy in chemical fluids contained in external tanks—as with fuel cells—instead of within the battery container itself. This permits the storage of more and more energy by scaling up the size of the tanks full of chemicals, which can be done more economically than by stacking up complete battery packs. By replacing the expensive metal ions typically used in flow battery production with quinones—organic molecules found in rhubarb and other plants—the team's design would cut the cost of chemicals for flow battery storage by 67%. "The intermittent renewables storage problem is the biggest barrier to getting most of our power from the sun and wind. A safe and economical flow battery could play a huge role in our transition off fossil fuels to renewable electricity. I'm excited that we have a good shot at it," Aziz commented by phone.



Dr. Michael Aziz, Gene and Tracy Sykes  
Professor of Materials and Energy Technologies,  
Harvard School of Engineering and Applied  
Sciences

Notable energy storage startup with different, potentially breakthrough technologies include [Eos Energy](#), [ViZn Energy Storage](#), [ZAF Energy Systems](#), [Ambri](#), and [Amprius](#), to name just a few.

As more Americans come to understand what goes on behind the scenes when they turn on a light, drive their cars, and adjust their thermostats, the collective IQ of the country with regard to energy policy increases. As more Americans power their lives with clean energy, the nation's perspective regarding legacy fuels is as likely to shift as the sun is to rise.

*About the Author: [Stacy Clark](#) is an environmental geologist, writer, and educator who researches and reports on clean energy developments. She is a member of the National Association of Science Writers and the Society of Environmental Journalists. Her first renewable power book for children, [When the Wind Blows](#), will be published by Holiday House in 2015. Contact her at [stacy@dallaswriter.com](mailto:stacy@dallaswriter.com). Follow her on [Twitter](#) and [Facebook](#). Connect with her on [LinkedIn](#). And Fan her at [Huffington Post Green](#).*

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**JamesWimberley** · 7 days ago

Germans tend to be sniffy about the American preference for solar leasing over ownership, which is financially more rewarding. The bad reason for this is that solar leasing in the USA spares the homeowner the absurd and byzantine red tape that Germans don't face at all. The good reason is that household savings rates are much higher in Germany (and, let's not forget, China), so many Americans have no alternative to third-party finance in some form to go solar.

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**Matt** · 7 days ago

Am I the only one feeling a little "teased" by the flow battery guys. Lots of talk, lots of money flowing thier way; but as Wendy said in the day "Where's the beef". Ok maybe its all happening behind the scenes in secret because it is that big a deal. But come on, how about a 1MW demo or something. I really want to believe! Oh and another subsidy we give "free" to fossil. Anyone want to guess the economic impact of the gulf spill, or the VW clean coal chemical spill?

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**ronwint** · 7 days ago

Thank you Stacy for mentioning \$0 down solar loans and their financial benefits. Consumers are bombarded by so much solar lease propaganda that most are totally incredulous when they're told that \$0 down solar loans exist.

Most consumers are convinced that it's cheaper to lease than to buy when in reality, solar leases and PPAs are two of the most expensive ways to have solar own your roof. Today, pricing for an installed, high quality, name brand, purchased grid tie solar system has dropped to about \$2.10 a watt after the 30% federal tax credit, yet solar lease sales people are still spreading the myth (lie) that the average sized solar system costs \$25,000. That price went out the window about 5 years ago. Today it's less than \$9,000.

They even tell consumers that they'll receive free maintenance, monitoring and insurance when in reality the consumer is paying so much more for their leased system when compared to a purchased system, that it is actually the consumer who is paying for these services many times over, not the leasing company. \$0 down solar loans and \$0 down PACE financing and \$0 down, non-collateralized LightStream solar loans need more press in order to compete with the leasing company's multi-million dollar advertising budgets and I appreciate you spreading the word.

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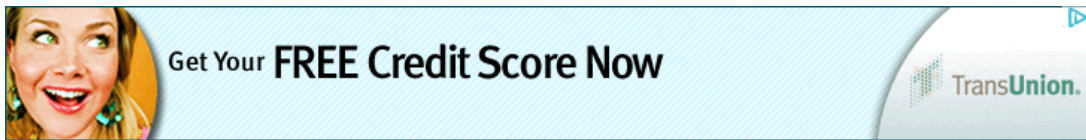
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