

Making Solar Easy: Removing the Barriers to a Solar Powered America

An Akeena Solar Whitepaper

Introduction

It's axiomatic in the solar business: economics drive installations. Today the economics are already compelling. For \$40,000 a typical 5 kilowatt rooftop solar system will generate power at 19 cents per kilowatt hour, without incentives. With current residential installation incentives, the same system costs \$25,000 and generates power at a very attractive 11 cents per kilowatt hour. That compares to the up to 25 to 37 cents per kilowatt hour that people in some states currently pay to their public utilities for electricity. And with each utility rate hike, the economics tilt even further in favor of solar power.

So why then does the US solar market—with the potential to be the largest in the world—still lag so far behind that of Germany and Japan¹, the world's leading solar markets? Why is this so even as demand for solar power in California, far and away the most solar-progressive state, continues to soar? Are there things that federal, state and local officials ought to be doing to make it easier and more convenient for residential and commercial consumers to benefit from solar power? Is there anything the solar industry itself can do to further improve the economics, aesthetics and reliability of solar installations?

Akeena Solar believes that, for the sake of energy independence, the environment and the economy, policymakers and solar companies need to do more to help consumers make the move to solar and escape from spiraling utility costs. This paper discusses three ways to make solar power even more compelling than it is today:

1. **Simplify the process for the consumer**—utilities and bureaucracies need to substantially reduce the red tape.
2. **Improve the technology**—the solar industry must introduce fundamental changes in the way solar is installed.
3. **Drive operational efficiency and customer focus**—solar companies need to exhibit efficiencies, economies of scale and customer-centricity.

Distributed solar power is already cost-effective—for consumers, if not for utilities. Progress on these three fronts will increase this cost-effectiveness, help accelerate installations for a more rapid return-on-investment, and boost consumer confidence in the effectiveness of solar power.

1. Making it faster and easier for the consumer

Legislative momentum is currently behind solar power. The “Securing America’s Energy Independence Act of 2007,” now in front of Congress, calls for a 30 percent federal tax credit for residents installing solar. If passed, the act would effectively halve the payback period for many solar installations. In the meantime, a much smaller but still welcome federal tax credit is in effect across the country. In California—which accounts for 85% of the US residential solar market²—the state has set a goal of creating 3,000 megawatts of new solar-produced electricity over the next 10 years. In support of this goal, the California Solar Incentive Program offers residential customers rebates of up to \$2.50 per watt, on top of federal tax credits. At least 23 other states have incentive programs of one kind or another as well.

¹ Cumulative market size in megawatts: Germany - 3,031; Japan - 1,700; US - 340

² [Solar Today](#)

Due to its size and solar-friendliness, California is setting the pace for the rest of the country. Throughout the state, cities and counties are slashing the costs of building permits for solar power to homeowners. In some cases, they are eliminating the permit fees altogether. Even more importantly, the state's Public Utility Commission (PUC) recently moved to streamline the California Solar Initiative application process, "removing all insurance requirements beyond those required for interconnection, waiving some documentation for smaller systems, and allowing self-installations to receive the California Solar Initiative incentive."³

Sidebar:

The Power of Solar Incentives

Policymakers provide incentives for rooftop solar power (also referred to as "Distributed Generation") because these systems provide a double benefit to society. First, they produce power in a clean and renewable way for 30+ years with negligible maintenance. Second, installing Distributed Generation systems such as rooftop solar avoids the expensive construction of new utility generation, transmission and distribution infrastructure. It's cheaper for electricity rate payers to install solar power systems at the edges of the grid than to pay utilities to build their own infrastructure.

In the California Solar Incentive Program, a \$3 billion solar incentive (paid by rate payers) will result in an \$8 billion infrastructure savings (which otherwise *would* have been paid by rate payers) plus an additional \$1 billion in economic and environmental savings. In short, a net savings of \$6 billion to the state.

Utility requirements restrain the market

But even as town and county costs decrease, and state incentive requirements start to loosen up, utility requirements continue to put a drag on the uptake of solar power in this most solar-friendly state. It's the utilities that are the *de facto* administrators of California's incentive program, and the paperwork and lead-times they require can be daunting and, for many consumers, off-putting.

Once consumers make the decision to go solar, they typically want to get started right away in order to start saving immediately and begin the return-on-investment process. Yet, in California, one large public (i.e.: shareholder-owned) utility has an approximate 11 week waiting time to just accept applications, and then adds two more months to fully process the application and start paying the incentives.

The 19 to 20 weeks taken by this public utility contrasts with the 6 weeks typically required by the state's municipal utilities, which have no shareholders and no profit pressures. There's a similar contrast in the amount of consumer paperwork required as well—with the public utility paper stack running upwards to 60 pages, and a typical municipal utility requiring just 20 pages. Additionally, the paperwork is so complex that consumers are challenged to do it by themselves, requiring them to turn to their solar installer for help and thus adding to the installer's cost structure.

³ California PUC news release, 9/6/07: *PUC Simplifies and Streamlines Solar Program Requirements*

Meanwhile, as the paperwork is processed and the weeks pass by, the consumer continues to pull power from the utility's grid and the utility continues to draw revenue from the consumer.

Where do towns and counties stand in comparison with regards to paperwork? In addition to reducing or eliminating building permit fees for solar installation, local governments typically require much less paperwork to initiate and complete a solar installation. Some are streamlining their permit processes as well, so that permits are issued in a fraction of the time it used to take. Unlike a public utility, they benefit from citizens going solar. It's interesting to note that at the end-game of the installation process, when the panels are on the roof and the system is waiting to go live, the local building inspector determines when a solar system is safely installed and ready to be turned on. But even with that approval, consumers still have to bide their time and continue paying the local utility as they wait for the utility's inspector to subsequently sign off on the installation as well.

In comparison, one only has to look at Germany to see how to not restrain a solar market. In 2006, Germany saw the installation of 11 times more new megawatts of solar power than the US. In addition, the average cost for an installed solar system in Germany is approximately 25 percent less than in the US. Not so coincidentally, Germany's incentive, building and utility requirements for solar are considerably less burdensome than ours, and a good part of that 25 percent cost differential can be attributed to Germany's relative lack of bureaucratic friction (see sidebar: *Paperwork Drives Costs and Delays*).

Towards a solution

For this scenario to change, federal, state and local policymakers in the US need to fully understand the administrative burden that exists around moving a consumer to solar power. This burden is not just on the shoulders of consumers making the switch. Ultimately it's shared by all utility rate payers who, whether they know it or not, help subsidize the incentive and utility requirement framework. Hence, policymakers need to be *highly* sensitive to the design and details of programs that impact the spread of solar in order to avoid unnecessary requirements.

Sidebar:

Paperwork drives costs and delays

Here's a sampling of some of the requirements for going live with a residential solar system in the US and claiming an incentive rebate. While not all states, communities and utilities require each and every one of these, the typical consumer can expect to get hit by several of them in the course of the overall process. In essence, only the asterisked items are truly necessary. The bulk merely add costs and result in delays.

- Incentive application* (in solar-friendly Germany, only this item is generally required)
- Complete copy of solar system purchase contract (redundant)
- Shading and orientation calculations (redundant)
- Interconnection agreement (irrelevant)
- Insurance requirement (irrelevant)
- System sizing worksheet (redundant)
- Energy audit (irrelevant to a solar power system)
- Engineering drawings (redundant)

- Building department inspection (sometimes multiple inspections required)
- Signed off building permit*
- Utility inspection (redundant)
- Rebate authority inspection (redundant)
- Interconnection authorization letter (irrelevant)
- Incentive claim application*

2. Improving the technology

Solar technology for high-quality, high-performance residential and small commercial installations has been relatively stable this past decade. Approximately 50 percent of the costs of an installation are in the photo-voltaic solar panels and the inverter. These costs have been coming down, albeit slowly, and are subject to price fluctuations caused by varying worldwide demand for refined silicon. The other 50 percent of the costs lies largely in installer sales, marketing, documentation and the mechanics of the actual installation, including racking, wiring and grounding.

Characterized by hard-to-assemble rack-mounted systems with a multitude of parts, there has been no major change in installation-related technologies in recent years that has substantially enhanced aesthetics, increased solar performance, improved installation speed and reliability, and reduced costs. That is, until now.

Andalay™

Akeena Solar's R&D efforts have resulted in the development of a patent-pending solar installation technology, named Andalay™, which delivers extensive benefits to both consumers and installers. Designed to work with existing and new solar cell technology, Andalay consists of plug and play solar panels that assemble quickly on the rooftop in much the same manner as LEGO™ bricks.

The key to Andalay is that all racking, wiring and grounding is, for the first time, fully integrated in the panels themselves. This revolutionary design provides numerous major advantages over existing installation technologies.

Superior aesthetics

With its integrated racking, wiring and grounding, Andalay enables solar panels to mount closer together and closer to the roof while avoiding unsightly exterior racks and bundles of wires beneath and around panels. Everything is a uniform black, including attachment points and hardware, for a more pleasing appearance.

State-of-the-art performance

As Andalay panels (incorporating high-efficiency crystalline silicon cells) can be positioned closer together, Andalay delivers more solar power per square foot than many existing technologies, meaning less wasted roof real estate. Andalay's integrated wiring, meanwhile, leads to lower resistance losses, thus further enhancing a system's overall performance.

Unparalleled reliability

Andalay panels are designed to take solar reliability to an entirely new level, with far fewer points of failure than existing technologies and ensured compliance with National Electric Code safety regulations. For example, the lack of exterior racking means a

lighter weight yet more rugged installation with 25 percent fewer attachment points, or roof penetrations. Moreover, all roof attachments are flashed to further minimize the potential for leaks. There are also 75 percent fewer roof-assembled parts, meaning less worker time on the roof and far fewer opportunities for workers to “not get it right.” Integrated wiring eliminates the chance of pinched or dangling wires, and the grounding process is integral to snapping together the modules, so it’s impossible to skip a ground between panels.

Additionally, with integrated racking and secure threaded connectors replacing friction clips between modules, there’s virtually no chance of panels loosening over the years from heat and cold cycling. Being able to mount closer to the roof also diminishes the chance of loosening from high winds.

Faster, safer, more efficient installs

In the time it takes to remove traditional solar panels and their external racking components from their boxes, an installer can easily finish a comparable Andalay installation. This is largely because there are significantly less parts, less complex roof assembly, and fewer tools to use and keep track of. Like adding the legs to a prefab desk or table, a few turns of a screw pull the modules together quickly and securely in a self-tightening fashion, while at the same time automatically and safely engaging the necessary grounding connections prior to a high voltage connection being made.

Cost savings

Because of its innate simplicity, Andalay reduces rooftop labor requirements by more than 50 percent, along with reducing an installer’s parts inventory and training costs. Hence, the potential exists to cut the costs of an installation by as much as 8 to 10 percent, on top of the many other benefits enumerated above. As Andalay comes on-stream in volume and an economy of scale develops, much of the benefits of these savings can be passed on to consumers.

Future of Andalay

Overtime, Akeena Solar intends to license and/or distribute Andalay to other solar installers in the US and abroad to help further drive solar acceptance and improve the economics of solar power.

3. Driving operational efficiency and customer centricity

The third part of the equation for solar success is the operational efficiency of solar installers. The US installer landscape is highly fragmented, and populated largely by small companies. Yet currently, installers possess the lion’s share of opportunities to make solar power even more cost effective than it is today. This can be achieved through the use of advanced new installation technologies such as Andalay, which reduce overhead, increase reliability and speed installations. But there is a spectrum of other success levers that installers need to pull.

First and foremost is a sustainable business model, coupled with excellence in sales, customer care and installation. The installer’s job is to make solar easy. In part, this means running a profitable business so as to be around to back up the long-term warranties on the systems they install. Sadly, the solar landscape is littered with companies that sold systems so cheaply that they went out of business, leaving their customers without warranty coverage. Making solar easy also entails maintaining an

accountable and well-trained workforce that can help consumers safely and effectively navigate the process of going solar.

The nation's leading solar provider, Akeena Solar takes customer-centricity very seriously. Some businesses have their first dollar on the wall. Akeena has photos of its first customers. From accurate, state-of-the-art job quoting to a customer financing partnership with Comerica Bank to providing all necessary documentation and projections to help consumers make educated solar decisions, everything Akeena does is aimed at making solar easy and affordable for the customer.

To help streamline cost structures, secure inventory and take advantage of the latest innovations, Akeena maintains close manufacturing partnerships with Kyocera, Sharp and SunTech, the world's three largest solar panel manufacturers. To help build economies of scale, Akeena continues to aggressively expand into areas where the climate, both natural and legislative, is favorable to solar. And to help build solar awareness, mold solar policy and advocate solar rights, Akeena executives are active in a broad range of industry associations and forums. This includes Akeena's CEO currently serving as president of the California Solar Energy Industries Association, the largest state solar power organization in the US, where his efforts have helped improve solar energy legislation and regulation in California and the U.S.

4. Summary

For more and more consumers, going solar is an easy decision, particularly as the costs of not embracing solar mount with each new utility rate increase. As citizens concerned with the welfare of our country, economy, environment and their own households, there are three things this "enlightened" group deserve:

1. A non-obstructive requirements environment.
2. Solar technologies that enhance the aesthetics, performance, reliability and cost-effectiveness of solar installations.
3. Solar companies with the vision, commitment and means to deliver affordable solar systems, sustained customer satisfaction, and an efficient, trouble-free switch to solar energy.

Answerable to their constituents, local politicians in many towns and counties where solar demand is on the rise are moving expeditiously to reduce permit fees and ease their part of the paperwork burden. Policymakers involved in shaping and implementing state and national solar programs need to be just as sensitive and forward looking.

Solar installers, meanwhile, need to do their part and embrace installation technologies that are higher performance, more robust, less invasive and ultimately less costly to work with. And just as they streamline what they do on the customer's roof, installers need to streamline their internal processes and make the customer the center of all their efforts.

Energy independence and the wide-spread production of clean energy are imperatives that our nation cannot delay. Taking the above actions will help create a much more solar-positive environment here in the US from which we will all benefit—governments, solar companies and consumers alike.