

LEADING IN GREEN

Insights from Executives in the Solar Industry

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We are in a race against time. The economic, environmental, and geo-political evolution of America's cleantech and solar industries are profoundly shaping our future. It is paramount that these industries continue to develop despite enormous market turbulence. That's why Emergent Solutions, Inc. and Mariposa Leadership, Inc. sponsored a study on the state of the clean technology industry, and in particular the solar sector, to elicit and share ideas and best practices for leadership, strategic focus, and staying nimble in the face of change. Our in-depth conversations over the last nine months with key executives from startups and venerable firms provided insight into what kind of leadership is needed to effectively address cleantech's distinct challenges and opportunities, and enabled us to put forth a unique point-of-view on key strategic drivers and the overall state of the market—especially for solar. Our conversation questions focused on leadership challenges, the future of the industry, strategic drivers, innovation, execution, and the recruitment, retention and development of future leaders; the answers were analyzed and interpreted to uncover key themes that capture the current situation and point toward future developments. The result is a nuanced report about the state of strategic development and leadership in a market that is crucial to the world's economy and the health of the planet. Three key findings of our study include the following:

- 2009 saw a sharp drop in venture investment across the clean tech industry, and the solar sector also saw a quickly increasing oversupply and lackluster demand. These factors set off a wave of consolidation and commoditization that is transforming the solar industry and causing a shift in emphasis from technological innovation to business model and process innovation.
- To survive and thrive in these competitive times, solar company executives would do well to follow some emerging best practices, including focusing on customer-centric business models, building brand identity, differentiating from competitors with bundled services, scaling up with process improvement, and recruiting and retaining business-minded people who are savvy enough to build bridges between widely varying constituencies.
- Leaders from across the industry will need to band together to sell the solar story to legislators and to the wider public at large while illuminating the favorable regulatory and policy environment for carbon fuels. The debate needs to be about creating a level playing field, increasing support to cleantech while undoing the incentives and regulatory structure that support fossil fuel consumption. Such a change requires widespread and focused leadership engagement.

State of the Industry

Our conversations took place at a particularly tough time. Despite many “true believers” in the industry who wanted renewable energy to be immune from the recession and help propel the rest of the economy out of it, the clean technology industry has been hit particularly hard. One of the biggest barometers was a crash in venture funding and private investment. According to the research group Cleantech Group, venture funding for cleantech peaked at \$2.6 billion in the third quarter of 2008 and then dropped precipitously over the next two quarters until it was at the lowest level in two years.ⁱ Of course cleantech was not the only industry facing a crunch; national venture funding for all industries fell by 50 percent nationally from the last quarter of 2008 to the first quarter of 2009. But whereas investment in health care remained steady and investment in information technology fell 53 percent over the year, investment in clean technology fell a whopping 74 percent.ⁱⁱ “Renewable energy is not for every investor, in terms of pain tolerance and revenue projections,” said study participant Tim Derrick, CEO of Southern California-based Axio Power, Inc., a developer of large-scale solar projects. “These concerns are not different from any other emergent industry, but it is compounded for renewables due to the large forces beyond anyone’s control: regulatory, cost of fossil fuels, the mixed soup of federal and state policies and macro trends. It takes a special kind of investor to want to wallow into that mix and expose him or herself to the risks inherent in this industry.”

Even so, a modest rebound for cleantech began in the second quarter and continued over the third.ⁱⁱⁱ Worldwide stimulus funds along with the September 1 announcement from Khosla Ventures that it had raised more than \$1 billion for investments in renewable energy and IT startups and the successful IPO of lithium auto battery maker A123 on September 24 seem to have broadened confidence enough to make cleantech once again the leading venture investment category. Recovery for the solar sector lagged behind other cleantech sectors during the second quarter of 2009, when it reached its lowest level of investment in over three years. But by the end of the third quarter, after investors channeled \$575 million into 29 solar venture capital deals, solar was back at the top of cleantech funding.^{iv} Although funding is still down 42 percent from a year ago, the rebound in investor faith is encouraging, and in the meantime the intensified competition for funding dollars is forcing an evolution of business models.

Two other factors specific to the solar industry are forcing change: oversupply and under-demand. Demand has been lackluster due to recession-induced slash in consumer and

commercial spending, the increased cost of borrowing money, declining incentives, and in some spot markets across the country, lower energy prices extending the length of time for return on investment.^v “Right now banks can’t use solar tax credits because they are having trouble raising capital generally,” said Joe Kastner, Senior Vice President of Fotowatio’s Renewable Ventures (formerly MMA Renewable Ventures). “This means not enough people can take advantage of the tax policy, so the industry is much more dependent on cash to make deals happen. And much tighter credit requirements for construction means many players cannot get the financing required to build say a 40 megawatt facility vs. a one megawatt facility.”

At the same time that demand has been hampered by market conditions, an excess of raw materials and inventory is squeezing manufacturers and collapsing margins up and down the supply chain, a situation some expect to last at least through 2010.^{vi} Newly plentiful polysilicon, the feedstock material for solar panels, has come down to \$50-60 per kilogram from about \$450 per kilogram during the last supply crunch.^{vii} The backlogs of photovoltaic panel inventory that accumulated over the recession are compounded by overproduction in countries such as China, where manufacturers take advantage of national subsidies to churn out cheaper panels that can be made in the US or Europe. Certain thin film makers are not immune, either; the 30-40 percent of thin film producers who are dependent on amorphous silicon fared well when prices for the more efficient PV panels were high, but as those prices have fallen, their cost advantage has eroded faster than their production costs.^{viii} Helen Nigg, who was a director at Bay Area-based Sunlight Electric at the time of our interview and is now the Director of North American Sales at Bosch Solar Energy, predicted that in the next five years, “more manufacturers will try to vertically integrate, a few integrators will combine forces to scale better or create a more flexible model.”

As the economy continues to improve and solar PV prices continue to drop, demand should begin to increase. This won’t be enough to foster a turn around, however; the industry must make a concerted, cohesive effort to sell the solar story, expand markets, and promote innovative business models, or demand will likely lag behind supply for some time.^{ix} As producers and those sellers who have backlogs of PV inventory or who are committed to contracts with suppliers at higher prices continue to struggle or fold, the industry has already begun to shift from an emphasis on technology and manufacturing processes towards customer solutions and services. But the shift needs to be fast and widespread. “Certainly for the next few years there will be way more production capacity than demand—so the shift is from who has the best gadget and the greatest efficiencies on the hardware side to who will distribute and sell it best,” said Danny Kennedy, co-founder and president of Bay Area-based Sungevity, a residential solar provider. “The focus is still on who has the best technology ideas, but what

we need more importantly is the solar Michael Dell.”

The harsh conditions of 2009 would predict that consolidation in the solar industry is imminent—and indeed, less than 50 percent of the more than 200 solar companies are expected to survive by the end of 2010.^x As early as March of this year the consolidation wave had already begun: San Francisco’s Recurrent Energy bought a portfolio of development projects from UPC Solar of Chicago; Arizona-based First Solar bought the project portfolio of Hayward’s OptiSolar; San Francisco-based MMA Renewable Ventures, one of the companies in our study, sold its core US assets to the solar power producer Fotowatio, one of Spain’s largest independent power producers. Buyouts, mergers and acquisitions have continued throughout the rest of the year in Europe and China as well as the US, with the larger companies snapping up the smaller companies and earlier stage startups. Large conglomerates such as The Bosch Group, Siemens, GE, Sharp, and Panasonic have been buying vulnerable solar companies to expand their product base. Consolidation is yet another selective force that is honing and maturing the industry: “Across the board, the industry will cross more into the realm of professional management or execution,” Derrick said. “The skills that allowed the early producers to achieve success will not translate into success as the industry matures. There will be a transition whereby firms who can leverage their production and marketing expertise will come in and take over from firms that don’t have these capabilities. Consolidation will accelerate; with smaller players either squeezed out or gobbled up, and companies getting larger. This is characteristic of a mature industry, and this is required.”

Effects on the Industry

Many of our conversation partners said they believe that commoditization and consolidation, while painful to many, will be beneficial to the industry as a whole. In fact they were more worried about the inability of the industry to scale up to meet future demand and make any dent in carbon emissions than they were about a continuation of the current market situation. “The market for residential and small commercial solar is four million roofs a year—that is the current number of new roofs/re-roofing in the U.S. each year,” said Jeff Wolfe, CEO of groSolar, a national solar installer and distributor based in Vermont. “The challenge is how to scale use over the next five years from the 15 thousand we do today. “

“We need to transition to a commodity market if we’re going to get anywhere close to the ambitious goals the industry has. We need to scale up in a big way,” said Kennedy. “PV has to be 20 to 25 percent of the grid. Think about 700-fold in four to five decades. It’s a huge

quantum leap from where we are today.”

Nigg agreed: “If we want to really save the world via solar, it needs to be about low margins and high volume—because we need to get it out there.”

Several of our conversation partners described the solar industry as “like the Wild West,” fragmented and full of niche “mom-and-pop” players who are either unable or unwilling to do what it takes to sell their existing inventory, much less scale to the numbers needed to affect climate change. These small players also can be unwilling to fight politically for the government subsidies and credits they rely on to create their markets. “People in solar don’t understand that their entire market is politically-constructed,” Kennedy said. “It doesn’t compete even in the residential retail space at the point of use, except in some small markets, without subsidies—and subsidies are created by politicians.” As consolidation and market pressures continue, many of these smaller firms will disappear, and along with them some of the fragmentation; the remaining industry leaders will need to come together politically.

Another issue is that many leaders in cleantech industries are still focused, even fixated, on guessing which model will “win.” In the transportation industry, the race is between all-electric engines, hybrids, hydrogen or biofuels; in the solar industry, it’s about whether we should create a centralized distribution model with large plants feeding into utilities—which would require big expanses of land, better storage, and a smarter grid—or a decentralized, distributed system at the point of use, which would require a whole army of installers and vastly improved local storage capacity, including better batteries. As Wolfe said, “We need both models. Which model will win? Both will win! We need to throw everything we have at this as quickly as we can.”

Another debate in the solar industry is about “grid parity,” the point at which solar electricity is equal to or cheaper than fossil fuel generated electricity. Those who believe it is imminent argue for the fast adoption of solar-friendly and fossil-fuel-unfriendly policies and tend to invest in the most advanced fourth-generation technologies.^{xi} Others in the industry say that grid parity isn’t a meaningful measure, and that more than just cost per KW cost needs to be taken into consideration, including lifecycle economics and regional parameters such as climate, grid mix and peak load. Some say reaching grid parity will crack the market wide open, while others warn that grid parity alone will not be enough. The result is that some industry leaders get stuck waiting for policies and subsidies to be clearly defined before moving forward with anything new.

Industry leaders need to keep moving on all fronts despite the fact that big issues remain unsettled, and regardless of final outcomes. There is certainly room for all approaches, and leaders should not be worried about what's going to win long-term, or get sucked into policy debates at the expense of their own company strategy. Despite lower demand at the present, the planet's need for more renewable energy is only growing. Wolfe believes clean energy would need to grow 4,000 percent over the next five years in order to make a dent in carbon emissions, but even sunny California is falling short of installing solar electric power on a million solar roofs—3,000 MW—by 2016, as well of the governor's latest target for utilities to hit 33 percent renewable energy. "A million solar roofs by 2016 will never happen if we have the current cottage industry," Kennedy said. "We do 20-40 solar roofs per day in California; to do a million by 2016, we need to do 200 per day. The industry needs to expand tenfold, and you don't have the companies that will."

Kastner summed it up nicely: "We are at the point where we should be pursuing all options for alternative energy development—everything we've got, and let things sort themselves out down the road. The idea that we should choose now between centralized distribution vs. a decentralized model, or that we should focus on reducing demand and conservation vs. new forms of generation is ridiculous. Our situation is so perilous that we need to do it all now."

Business Strategy and Innovation

Tough times and intense competition can breed opportunity, and the optimism of the industry's leaders has combined with the race for survival to create an environment of disruptive innovation. Market forces will continue to drive a transition to a more professional, business-savvy management, and industry maturation will accelerate. This will force a shift from an over-emphasis on technology and hardware to a focus on business models, process innovation, and return on investment. A set of leadership best practices is emerging in the cleantech field including the following: (1) Focus on customer-centric business models, adding vertical integration where possible; (2) Build brand identity, including a strong customer education component; (3) Differentiate from the competition with value-add services and applications; (4) Prepare to scale up production and installation with continual process improvements; (5) Spend the time necessary to recruit, retain and develop business-minded people who are savvy enough to build bridges between stakeholders and workers with disparate interests, skills, backgrounds, and values; and (6) Allocate time to working on behalf of the industry as a whole—fighting to make the policy environment supporting fossil fuels more transparent and creating a narrative that will sell the solar story to legislators, regulators, potential customers,

and the wider public.

(1) Focus on customer-centric business models, adding vertical integration where possible

Many of our study participants already have customer-centric business models, but this is not necessarily true of the wider industry. After attending the popular InterSolar U.S. conference in July, the Canadian analyst Jon Warren observed that most of the companies attending gave few indications that they realized the need to be customer-oriented. He predicted that many of those would not be around much longer, and that without a widespread adoption of customer-centric principles, the overall market growth would develop much more slowly than the underlying economic factors should dictate.^{xii} As a result, companies that do focus on marketing, product development and customer service will improve their chances to prevail. “Much of the overall expense to the end-customer is in floating costs: selling, general and administrative, marketing, installation, not in the research and development or manufacturing of the panels themselves,” Kennedy said. “So, there’s way more efficiency and reduction in prices to be gained by focusing on the channel. There’s a lot more room for innovation and creativity there.”

Potential solar customers face—or believe they will face—a huge amount of complexity and frustration in figuring out which solar system, if any, is best for them. Anything a solar company can do to simplify the process and ease that frustration will translate to more sales. Some customer-centric companies are attempting to meet this need by serving as product integrators for particular niches. These companies, several of which participated in our study, help simplify the process and product for the customer by analyzing the roof or site, designing and engineering a custom system, picking and choosing the best components from a variety of suppliers, vetting third-party installers and providing monitoring software.

“You need to define the target customer, and [figure out] what is the solution,” said Nigg. Sunlight Electric is a great example of an integrator focusing on a particular customer niche—small to mid-size commercial, “under the radar of the big boys,” as she said. The company serves wineries, dairies, creameries, organic farms and other sustainable agriculture markets, designing custom systems to fit these unique landscapes—including placing PV panels on the end of winery rows, on non-productive areas of a farm, or engineering a system to span long distances. They also provide one consultant who stays with the client from beginning to end, rather than having a sales rep hand off to a project manager who hands off to an installer. “These systems are in place for thirty years, so you need to execute everything well, versus just putting the marketing twist on the sale,” she said. “Service and maintenance components

are just as important.”

Other companies strive for better customer service with vertical integration; by controlling the process from manufacturing to installation, they can save on costs and ensure quality while providing one-stop shopping to meet all of their customers’ needs. As an example, vertically integrated SunPower charges a premium for their own manufactured (and trademarked) high-efficiency panels and bundled services, including project management, installation, and monitoring. Because they own the process end to end, they can offer a 25-year warranty, an industry first. “A big challenge is making the renewable accessible, from manufacturing to marketing to financing to good installers,” said SunPower CEO Tom Werner. “Solar systems need to be sold in a way that simplifies the customer experience dramatically.”

In the large-scale solar power plant arena, vertical integration can open new and bigger markets. For example, Arizona-based First Solar was primarily a thin film manufacturer that, after going public in 2006, bought Turner Renewable Energy in 2007 as a way to get into the project development business.^{xiii} During the height of the recession, in order to create a larger market for their solar panels in the US, they began constructing utility-scale solar power plants in earnest. In April of 2009, they bought the project pipeline of its rival OptiSolar. Before they bought it, their largest undertaking was 10 megawatts. But by early September, just a few months after Suntech, China’s largest PV manufacturer, announced it was building a PV manufacturing plant in the US to take advantage of incentives from both the federal and state governments, First Solar won a contract to build a 2-gigawatt solar plant in Inner Mongolia. The first non-Chinese firm to build a large facility in China, it will benefit both from existing subsidies and the feed-in tariff China is expected to create to guarantee the price of electricity from the plant for some number of years.^{xiv}

(2) Build brand identity, including a strong customer education component

Many consumers who are considering adding solar panels remain confused about their choices of company, installer and technology. A survey in September of this year vetting 150 installers showed that the average installation company is very small, and there is little to no name-brand recognition in the market.^{xv} Very few companies advertise outside of a small local radius. SunPower is one company that has an advertising budget for radio and print ads; their current “Seize Today” campaign sells “the promise of solar power as a reality for everyday Americans.” This is a way to reach beyond the immediate potential customer to the broader public, putting thoughts of solar in the minds of those who hadn’t yet considered it. When they are ready to investigate, people will call the company whose name they recognize—and

trust. “Who can you trust to be around in 25 years if you are a homeowner?” Kastner said.

Consumer education needs to be a strong component of any branding and marketing campaign. Potential customers need to understand the relevant regulations and incentives as well as available technology and financing options before they can make a buying decision. They also should understand how local weather and climate conditions, equipment limitations and warranties, and political changes down the road could affect their return on investment. Beyond those basics, many may feel the need to understand net metering, feed in tariffs, lifecycle economics, Levelized Cost of Electricity (LCOE) and other regulatory and industry jargon, while others may take a leap of faith and make a values-based decision regardless of their industry knowledge. Because any one company may spend a lot of time educating a potential customer, only to lose that customer to a competitor or to a decision not to move forward, group workshops and classes may be more efficient at covering the basic than sending a sales person to work with a customer one-to-one. Branded outreach campaigns and workshops are an excellent opportunity to get the company’s name into the wider community. John Litman, Director of Customer Care at California-based Solar City, suggests also putting on seminars for building inspectors and any other constituents: “For example, firemen who stick hatchets in the roof can get electrocuted.”

(3) Differentiate yourself with bundled services

“The service of electricity is about cold beer and warm showers at a reliable cost,” Kennedy said. “Bundling the components that provide the service needs to be a branded customer experience. That’s the space where innovation is required.” These bundled services can include anything from designing the system and custom-selecting components to monitoring and maintenance. At the front end of the customer acquisition process, software applications such as Sungevity’s iQuote provide increasingly accurate estimates for residential customers. Although a number of premium firms offer custom engineering based on site analysis, what is unique about Sungevity’s application is that it uses satellite imagery and aerial photography to analyze a potential customer’s rooftop without having to send a sales representative to their home. For clients in the Bay Area, Sungevity uses the data to design and engineer an appropriate system, and then send out one of their own contracted installers. But they also have begun selling the software and design services to other installers outside the area, saving these installers time and money on analyzing roofs for customers who may back out or turn to some other provider. The installer gets a qualified lead and a custom design from Sungevity, Sungevity gets a fee, and the customer gets an expertly tailored solution and referral to an expert installer. “We look for a niche—the real opportunity is in the distribution. Make it easier

and more affordable to buy solar, and sell it like software-as-a-service," Kennedy said. "It's not a technology or PV efficiency play. The power is moving downstream from the manufacturers—Sungevity knows the customer and they dictate the standards."

Other firms help customers over economic barriers to entry by offering financing. Renewable Ventures in 2002 pioneered the solar PPA (Power Purchase Agreement), which lets commercial customers pay for the energy they use at or below utility prices, from a professionally managed solar power system with neither capital costs nor maintenance requirements. Solar City, which calls itself an "all-in-one, full service provider," pioneered a residential leasing option, in which customers pay no or some money down in order to have the solar panels placed on their roofs, and then pay monthly on a long-term contract for the electricity they generate. Solar City is also branching into solar electric vehicle charging stations, helping to address the needs of the well-heeled and eco-fanatic customers of its sister company, electric vehicle maker Tesla Motors. "Solar as an industry is not fully established; the value proposition is getting people to believe in the product," said Litman. Now other firms are starting to offer financing packages to their customers for purchasing or leasing systems or refer them to a partner who can finance them.

Differentiation through premium services is not the only way to stand out. Wholesale Solar, from Mt. Shasta, CA, plays at the opposite end of the spectrum. Rather than sell high-end systems at premium costs, they design plug-and-play systems that customers can buy at wholesale prices and either install themselves or hire a recommended contractor. Playing to value-conscious consumers in the recession, their business is up by more than half this year, according to the owner.^{xvi}

(4) Scale up production and installation with continual process improvements

Just as important as business model innovation is process innovation, from the manufacturing floor to the "last mile," the installation of a system on a customer's roof. "A key issue moving forward is the need for process improvements in many areas," Wolfe said. "Construction methods for residential and commercial solar projects haven't changed since the 1960s, making it difficult to gain the scale required to put hundreds of thousands of small projects vs. the fifteen thousand or so done in the US annually today. This means standardized, replicable installation processes for solar should be used throughout the construction industry, especially since so many solar projects are done by contractors with little experience otherwise in the industry." He advocates "making installation as turnkey as possible."

To that end, companies such as SunPower, groSolar and SolarCity handpick, train, certify, and monitor their own networks of subcontractors on standardized installation practices. Others such as Renewable Ventures and Sungevity take themselves out of the installation game and instead focus on design, process and engineering services that wrap around the installation to take away guesswork and reduce the margin of error. Beginning in early 2010, groSolar will be using novel technology to make the installation process faster and easier: "We have partnered with Zep Solar to introduce a revolutionary racking system that greatly speeds installation and requires less skill. We will be coupling this with other innovations in 2010 to move closer to the ideal of requiring lightly skilled labor for the majority of the installation work, with trained electricians required only for the interconnection," Wolfe said.

Another form of process engineering comes from analyzing the functioning of solar systems across their lifecycles. Monitoring systems used to only be installed on larger commercial systems due to cost, but are becoming widespread on residential systems as well: groSolar, Sungevity, SolarCity, and others have all introduced residential scale monitoring systems to allow remote monitoring and reporting to ensure better operation of systems. Study participant Fat Spaniel Technologies specializes in these systems, "serving as a provider and verifier/measurer of a system's efficiency," according to CEO Chris Beekhuis. Fat Spaniel has created a software platform for building, sharing and running energy data applications that include remote monitoring and reporting services. These software-as-services are aimed at decreasing the downtime from smaller systems to large plants, which are often distributed over large geographic areas and managed by off-site staff. Plants can't be down more than two percent of the time to be profitable, and accurate diagnosis can make the difference between success and failure. With such careful monitoring, process and equipment improvements can be made in real time. "Our strategy is to innovate continuously, releasing new products every month, and to be the essential platform for energy information across the solar industry," Beekhuis said. "We want to provide a set of tools and interfaces so that third parties can come in and do it—we'd like to be the Salesforce, Appexchange, or Amazon of the solar industry."

Solar industry executives should be open to the possibility that technological innovation could leapfrog incremental process innovation. groSolar's use of Zep Solar's technology mentioned above is one example. In another example, some installation problems could be obviated for some segment of the market by The Dow Chemical Company's forthcoming thin-film solar shingles, due out in mid-2010. Dow claims that these shingles will be able to be installed just like conventional asphalt shingles, by any roofing contractor with no specialized skills or knowledge.

5) Spend the time necessary to recruit, retain and develop the best people

To ensure that the business model and process innovation needed to transform the industry into one that can scale up to meet current and future energy needs occurs, we believe that executives need to recruit more professional business managers. As many of our conversation partners have pointed out, traditionally the solar industry has been filled with small shops led by “true believers,” who may fail at selling by trying to impose their values on potential customers, or lose faith and burnout, or cannot scale their operations. “At one end of the spectrum are true believers, guys who are very values-driven. It’s a dying breed of leadership today, still relevant and important, but few of these guys have been able to make the transition to build, shape and shift the company to adapt to current times,” Derrick said.

“At the other end of the spectrum are the opportunists—leaders who are looking to exploit a growing trend in renewable energy, applying entrepreneurial lessons. Their successes are temporary, as they don’t stick around long because people recognize there’s not a lot of substance behind what they’re doing,” he said. Many of these opportunists arrived during the 2000 boom years, especially from the high tech and .com worlds; the failures they have may be due to their arrogance, being unable to work with or influence the true believers, customers and/or partners. They can also make technological and production errors simply because they are now dealing with tangible products in the real world rather than bits and bytes, and craftsmen and laborers rather than engineers. The pace of solar is also much slower than in tech, as Derrick said, “There are lots of people jumping into the industry with bright technical minds who understand what it takes to get things done, but sometimes they come up short. It’s kind of an intangible—but if you’re trying to identify a trait among technical leaders, it’s an intuitive sense of what will work and what won’t work in this industry.”

What the industry needs, then, are professional managers who can bridge the divides between the true believers and the opportunists, the professional sales and marketers and the blue-collar installers. The industry needs people who truly want to make the world better and have the ability, training, ambition and vision to do so, people who will bring in new business models that can make money and save the planet at the same time. “Workforce development is critical since we need people with high school and college degrees. We need to ask ourselves, ‘How do we get more good people into the field?’ We should be focusing on bringing in regular management while keeping the mission-orientation values so important to renewable energy,” said Wolfe. “It’s not either/or—it’s both/and.”

“The kind of leadership we need today is one that combines the true-believer values with professional management. We need leaders who can speak the language of the utility industry, bridge the values/professional management divide, and keenly understand the benefits/challenges of renewables at a very granular technical level,” Kastner said. “Today at Renewable Ventures we have about 50 people on board, and it’s about 50-50 engineers and MBAs. We contract out all construction and they use our designs, plans, processes and financial models.”

Industry executives will also need to know how to retain the good people once they’ve been found. “Solar presents challenges that others don’t get. You have to pay attention to the culture you’ve established,” Litman said.

Werner says that a key talent strategy is for the company to have a strong values system. “If the values system of the company is strong and you build a great company, then your value proposition of ‘saving the world’ becomes real to your employees. The likelihood of success for changing the world is better if you’re working at a great company,” he said. “This is a key talent management strategy. When we conducted focus groups to find out what [our people] wanted, they came back and said ‘make Green Real.’ Demonstrating to employees that the organization they are with is solid, stable and visionary enough to deliver on the cleantech industry’s promise of ‘changing the world’ is a key retention strategy.”

Other recruitment and retention strategies suggested by our conversation partners include building brand name recognition, allowing autonomy and creativity, fostering a culture of respect for different backgrounds and skill-sets, encouraging people to seek industry recognition, and delivering on the mission. “You retain talent by giving them ownership, continuing to find ways to highlight their work, to win awards, to get them good press—non paid versions,” said Charisse McAuliffe, Founder and CEO of Gen Green LLC, which produces a nationwide directory of green businesses. Other best practices across all industries include allowing recruits to take on challenging tasks, broaden their skills and cultivate networks inside and outside the company. Leaders also need to lead by example by doing everything they can to make their own companies and houses energy efficient, from light bulbs to PV panels.

6) Allocate time to working on behalf of the industry as a whole

It is critical that solar industry leaders band together to message and SELL the cleantech story, the renewable energy story, and the solar story not only to people who are green-minded but to the broader public at large. “A big force for entropy is our culture here in the US. People

don't understand [the need for cleantech] from a cost/benefit point of view," Wolfe said. "The socially constructed market for fossil fuels is obscured as it is hidden in dense, yet favorable corporate tax treatment, while the social costs of fossil fuel use are not visible and not accounted for on a company basis, but rather on a collective basis. We ought to launch a nationwide campaign for Solar similar to the "Got Milk" campaign that would familiarize consumers with the pros and cons and true costs/benefits of solar."

Many people are only dimly aware, if at all, that the price of solar per watt (W) has dropped as far as it has. Last February, First Solar made a splash in the trade press by announcing they had hit a major milestone: manufacturing costs for their thin-film photovoltaic panels had dipped below \$1.00/W for the first time. Installed costs, of course, are much higher, but the reduction of manufacturing costs across the industry over the past two years has contributed to lower costs for end users. After a several-year period of no price movement, the average installed cost across residential and commercial, prior to the receipt of any rebates or credits, dropped from \$7.80/W in 2007 to \$7.50/W in 2008.^{xvii} A year later, Wolfe estimates that the installed cost of a residential system is down to around \$6.00/W, and he predicts that it will break \$5.00/W in some areas in 2010. Consumers need to be educated as to what these prices mean in terms of reducing their energy bills, now and as conventional energy rates rise in the future, and how long it will take to recoup costs. And industry leaders need to understand the value of transparency across the market: with the industry so fragmented, consumers can end up paying a much higher rate per Kilowatt hour (kWh) than their neighbor, and understandably are either upset and frustrated or decide to wait until prices come down even further. More and more companies are offering online quotes, and one company, Block Off the Grid—a group of San Francisco investor/entrepreneurs that helps homeowners in same city organize in groups of 100 or more to purchase solar power in bulk—is working on a website to aggregate quotes from different companies to make prices more transparent.

Leaders need to push for similarly creative ideas to take the anxiety, variability and red-tape out of the buying or leasing process across the industry, and then communicate broadly how easy and cost-effective it is to go solar. This includes creating a cohesive media strategy to contradict conflicting information—for example, in August *The San Francisco Business Times* ran an article entitled "Rising cost of solar keeps buyers away," while a few weeks later the *Wall Street Journal* ran one entitled "With solar prices falling, now is the time for consumers to take a look." If consumers feel they are getting mixed messages on basic facts, they will not trust more critical information trying to persuade them of the benefits. "If we want to gain scale, we have to control the message (the narrative)," Wolfe said.

At a deeper level, people need to be educated as to why they should consider solar at all. Not everyone is motivated by a need to save the earth; some won't believe that purchasing one system will make any difference. Others may be motivated by lower utility bills, but be wary of big outlays or locking into a long-term lease. Renters and people expecting to move have even higher barriers to entry. Industry leaders need to weave a narrative that makes the value proposition crystal clear, and to pair that story with solutions to meet every need or objection. "How do we get the focus off of the technology and make the story more compelling?" asked Brian Gitt, managing principal of the energy consulting firm Bevilacqua-Knight, Inc. (BK), which is designing community-scale programs to help support state-wide initiatives. "We must show tangible benefits to customers; a very small percentage of the population will buy the technology only due to values alignment."

It is not only the public for which industry leaders need to craft a strategic narrative. Industry leaders also need to work together to push legislators for incentives and subsidies that will move solar to grid parity more swiftly, to overcome utilities' objections to making renewables too popular, and to publicize and fight for the removal of the well-disguised fossil fuel subsidies. "Our subsidies are highly visible and talked about continuously, and it is true that, at least for now, deals can't get done without them," Kastner said. "Meanwhile, the significant subsidies given to the fossil fuel industry are not talked about at all and are not visible. This is creating a truly distorted model for energy development and consumption where the true cost of development, commercialization, distribution and impact are obscured." He advocates for pushing for a cap and trade scheme and or a direct tax on carbon to essentially the fossil fuel industry's advantage. "Also, despite positive moves on the federal level, we are still confronting many different state regulations, mandates, and subsidy policies," he said. "This makes it very difficult to support solar energy across state lines."

How do you influence political, regulators, legal and environmental groups into cooperating? Communicating with such disparate stakeholders presents a huge challenge. "Leadership has been the barrier; it's complex because it's a combo of policymakers, building professionals, outreach organizations, market actors, and real estate professionals that all try to educate consumers. It's like herding cats—getting them all to buy into a common framework and message and value proposition. It takes a lot of leadership to entice all these different actors to operate from the same page," Gitt said. "What's needed is to have the capacity to understand this complex ecosystem and interrelatedness of factors, to know your audience, and to distill the message into a really understandable story or soundbyte/message."

To do all this, "We need a visionary, hungry, ambitious leadership," Kennedy said. "If we're

really talking about solving our climate change by transforming our energy supply via cleantech, it is such a huge transformation. It requires hard-fought battles against incumbent technologies and entrenched interests—leaders need a big grand vision for long-term success. Instead, we're all head down in the weeds of each individual's own challenges of running a small business."

Conclusion

In order to avert catastrophe from climate change, it is imperative that we rapidly deploy cleantech technologies, especially renewable energy. Solar needs to be a huge part of the mix. But current market conditions have suppressed investment funding and demand while increasing supply. This is causing a wave of commoditization and consolidation that is transforming the solar sector into a more mature, business-focused, customer-centric industry. Many smaller and more vulnerable companies have already folded or been bought by bigger and stronger firms, and this trend will continue. For their companies to not only survive the intense competition but to help to grow demand to the level the planet needs, solar industry leaders should follow some emerging best practices, including focusing on customer-centric business models, building brand identity, differentiating with bundled services, preparing to scale up with continual process improvements, and spending the time necessary to recruit, retain and develop business-minded people. Most importantly, they need to band together to create a narrative that will sell the solar story to legislators, regulators, potential customers, and the wider public. Before we can move to a world where power from the sun is maximized while use of fossil fuels is minimized, a much wider set of people, businesses and utilities need to believe the benefits of going solar outweigh their costs and that the process can be simple and painless. "At the end of the day, the number one challenge is culture change," Wolfe said. "If we value it enough as a society, it would be easier. We absolutely must work on the culture shift in order to pick up the pace of solar and renewable energy installation."

NOTES

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