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Solar power: Darkest before dawn

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Those who believe the potential of the solar industry has dimmed may be surprised. Companies that take the right steps now can position themselves for a bright future in the coming years.

Krister Aanesen, Stefan Heck, and Dickon Pinner

In less than a decade, the solar-photovoltaic (PV) sector has transformed from a cottage industry centered in Germany to a $100 billion business with global reach. Among the factors contributing to its growth were government subsidies, significant capacity additions from existing and new entrants, and continual innovation. PV prices have fallen dramatically, and by 2011, global installed capacity exceeded 65 gigawatts (GW).

PV prices are expected to continue to fall—even though subsidies are expected to dry up—as manufacturing capacity doubles over the next three to five years and underlying costs drop by as much as 10 percent annually until 2020. Indeed, our analysis suggests that by the end of the decade, costs could decline to $1 per watt peak (Wp)[1] for a fully installed residential system. But even if costs only fall to $2 per Wp, the industry is still likely to install an additional 400 to 600 GW of PV capacity between now and 2020.

Such a scenario could bring dramatic changes across the globe. Rapid growth of distributed generation could disrupt the regulated utility industry in countries that belong to the

[1] In photovoltaics, the output of a solar generator operating under standard conditions is defined as its peak output, which is measured in watts or kilowatts and expressed as either watt peak (Wp) or kWp, respectively.

Organisation for Economic Co-operation and Development (OECD). In non-OECD countries, distributed generation (in combination with inexpensive storage solutions) could bring electricity to millions of poor people living in rural areas, greatly improving their standard of living.

Given the potential economic benefits, competition—already fierce—would intensify under such circumstances. Manufacturing is likely to become more standardized and commoditized as the industry matures, reducing opportunities for upstream players to differentiate themselves. Our research suggests that the industry may consolidate across the solar value chain as participants compete for capital and access to customers.

Downstream players will have the greatest potential to generate value, particularly when demand for distributed generation hits an inflection point after 2015. The biggest winners are likely to be those that target the highest-value customers in the distributed-generation segment, delivering quality products and services in multiple regions at scale while keeping their customer-acquisition and operational costs low.

In this article, we highlight five customer segments that could be particularly attractive over the next 20 years, excluding subsidized sources of demand such as feed-in tariffs, renewable-portfolio mandates, and tax credits that constitute the majority of today's installed capacity. We also outline a number of steps upstream and downstream players could take to position themselves for success in this new environment.

Market evolution

Over the past seven years, the solar industry experienced unprecedented growth. The price of solar-PV modules dropped from more than $4 per Wp in 2008 to just under $1 per Wp by January 2012, and global installed capacity increased from 4.5 GW in 2005 to more than 65 GW today.

The subsidies that made solar PV economically attractive for many consumers set the conditions for the boom. Demand rose, new entrants flocked to the industry, and the pace of innovation accelerated. But the boom also laid the foundations for a bust. Manufacturing capacity increased dramatically—particularly after large-scale, low-cost Chinese manufacturers entered the space—and the market became oversupplied. Prices dropped precipitously, which fueled demand but put pressure on margins. In the near term, demand may not keep up with supply growth; governments are continuing to reduce subsidies due to the effects of the economic crisis, and the shale-gas boom is beginning to take hold in the United States. (See the sidebar "The global boom-bust cycle in solar PV" for more on how the market evolved from 2005 to 2011.)

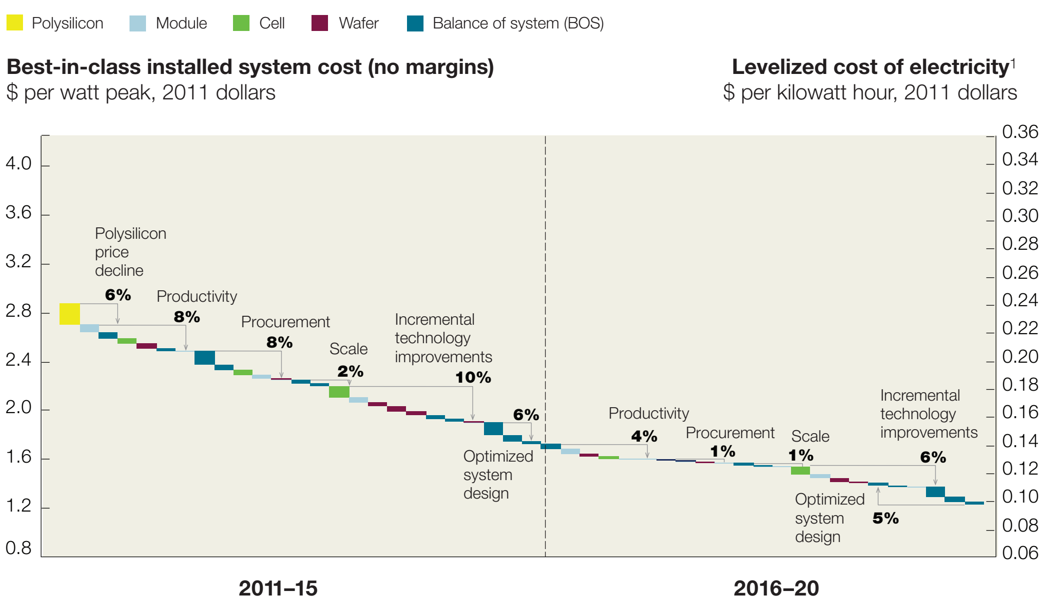
It may therefore appear that the solar industry has run its course. A number of solar companies have already declared bankruptcy, many more are hovering on the brink, and the MAC Global Solar Energy Index fell 65 percent in 2011. Moreover, there is little doubt in the near term that existing players will face difficulties. Several global technology and manufacturing companies—including Samsung and Hanwha from Korea, TSMC from Taiwan, and GE from the United States—have recently entered or announced their intention to enter the manufacturing segments of the solar value chain. Their efforts, combined with those of existing Chinese companies, could considerably increase global manufacturing capacity in the next three to five years, even as subsidies continue to shrink.

But these are natural growing pains, not death throes. The industry is entering a period of maturation that is likely to set the conditions for more stable and expansive growth after 2015. To succeed in this environment, companies must turn their attention to the relatively prosaic objective of reducing costs without giving up on the imperative to innovate, which has been critical to success thus far. Indeed, companies have an opportunity to reduce their costs dramatically by adopting approaches widely used in more mature industries to optimize areas such as procurement, supply-chain management, and manufacturing. For example, our analysis suggests that the cost of a commercial-scale rooftop system could be reduced by 40 percent by 2015, to $1.70 per Wp from roughly $2.90 per Wp, and by approximately another 30 percent by 2020—to nearly $1.20 per Wp (Exhibit 1). Thus companies could position themselves to capture attractive margins even as prices for PV modules decline.

Exhibit 1

Industrialization will yield significant cost reductions.

c-Si multicrystalline solar-photovoltaic system



[1] Levelized cost of energy; assumptions: 7% weighted average cost of capital, annual operations and maintenance equivalent to 1% of system cost, 0.9% degradation per year, constant 2011 dollars, 15% margin at module level (engineering, procurement, and construction margin included in BOS costs).

Source: Industry experts; Photon; GTM Research; National Renewable Energy Laboratory; US Energy Information Administration; Enerdata; press search; company Web sites; McKinsey analysis

Potential evolution of solar-PV capacity in the United States

The unsubsidized economic potential for distributed residential and commercial solar photovoltaic (PV) in the United States is likely to reach 10 to 12 gigawatts (GW) by the end of 2012. This is not the amount of PV capacity that will be installed, but the amount that producers could sell at a profit because it is competitive with other options (such as purchasing electricity via the grid from a traditional utility) on total cost of ownership.

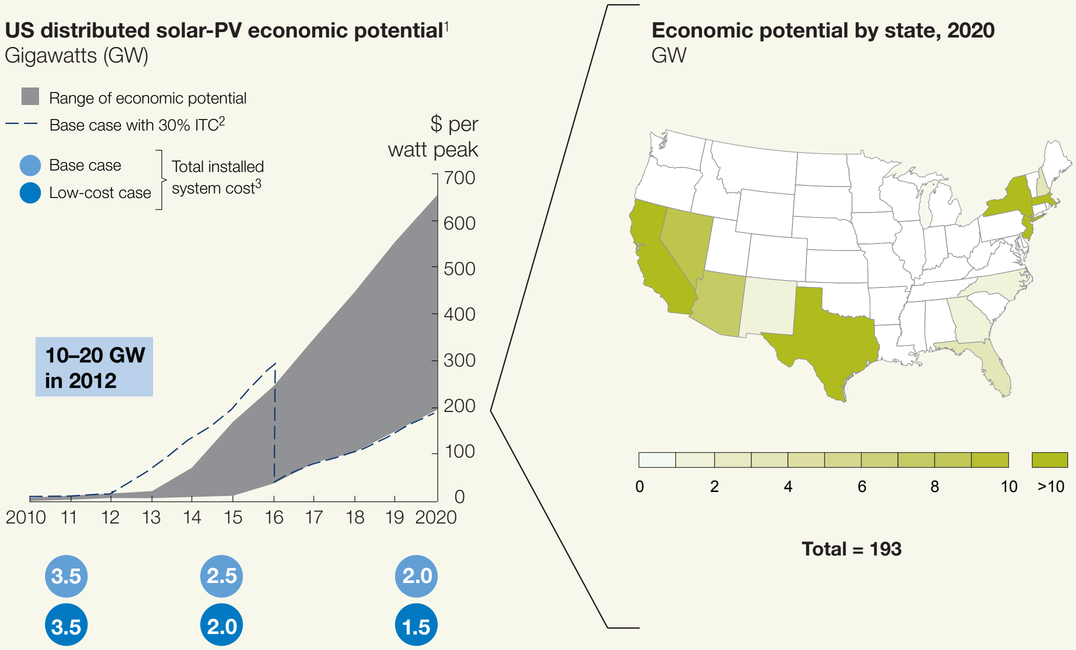
Growth is likely to continue in these segments after 2012, potentially reaching a tipping point in 2014 or 2016 that could enable unsubsidized demand for solar PV to grow to between 200 and 700 GW by 2020. Demand is likely to be concentrated in 10 states. Indeed, 50 percent of the available power delivered to the residential and commercial segments in some of these states may be generated by solar PV in 2020.

Our estimates increase dramatically when we include the effects of subsidies from the federal government's investment tax credit,[1] which could enable installed capacity of solar PV to climb as high as 70 GW by 2013 (exhibit).

[1]The investment tax credit, which is in effect through December 31, 2016, provides a reduction in the overall tax liability for individuals or businesses that make investments in solar-energy-generation technology.

Exhibit

Solar PV for distributed generation is approaching an inflection point in the United States.



[1]PV = photovoltaic; economic potential assumes 20-year lifetime and 8% cost of capital, computed separately for residential and commercial segments using actual retail rates, schedules, and tiers.2Investment tax credit
[2]Investment tax credit.
[3]Numbers quoted are for a best-in-class commercial rooftop system; residential systems modeled with 30% higher price to account for higher installment costs.

Source: US Energy Information Administration; Ventyx; utility filings; National Renewable Energy Laboratory; McKinsey US low-carbon economics toolkit

The prize: Distributed generation

Our analysis suggests that the global economic potential for total installed solar PV—that is, the amount of PV that could be operated at a lower levelized cost of energy (LCOE)[2] than competing sources—could exceed a terawatt (1,000 GW) by 2020. However, given the barriers to implementation, such as possible changes to the regulatory environment and access to finance, we expect installed capacity to increase to between 400 and 600 GW by 2020.[3]

At this level of demand, annual capacity additions would increase by a factor of three to four, climbing to 75 to 100 GW in 2020 from 26 GW in 2011. Price declines mean that the annual revenue generated across the value chain will probably remain flat, about $75 billion to $100 billion per year, despite the fact that margins may begin to rise around 2015. Nevertheless, our analysis suggests annual installations of solar PV could increase 50-fold by 2020 compared with 2005, achieving installation rates that could rival those of gas, wind, and hydro and that might outpace nuclear.

This growth will stem largely from demand in five customer segments over the next 20 years. Four of these segments are likely to grow significantly by 2020; the fifth is likely to grow significantly from 2020 to 2030 (Exhibit 2).

1. Off-grid areas. Solar power is ideal in places without access to an electric grid. Applications include delivering power to agricultural irrigation systems, telecommunications towers, remote industrial sites such as mines, and military field sites. Within this segment, the most significant potential resides in areas that use diesel generators to provide uninterrupted power supply for remote infrastructure, such as telecommunications towers in India. Off-grid applications have been economically viable in some locations for several years, but the lack of low-cost financing for remote sites—where credit risk is often relatively high—has made it difficult for companies and customers to afford the upfront costs of installation. The dearth of local distribution partners has also impeded growth. Nevertheless, our research indicates that demand in this segment could reach 15 to 20 GW by 2020.

2a. Residential and commercial retail customers in sunny areas where power prices rise steeply at times of peak demand. Many businesses in places like California, Hawaii, Italy, and Spain already generate their own power using solar applications. In the near term, this segment's growth will depend on the availability of low-cost financing, customer-acquisition costs, and reactions from regulated utilities. For example, in the United States and Europe, there is a risk that utilities could request to modify their rate structures to make switching to distributed generation less attractive for customers. In Hawaii, regulations require anyone located in a region where distributed generation represents 50 percent of peak demand to undergo a lengthy and costly review process before adding distributed solar capacity.[4] In India, companies such as SunEdison (now part of MEMC) have partnered with organizations like the World Bank's International Finance Corporation and the Export-Import Bank of the United States to establish programs that enable preapproved financing. Our analysis suggests that the demand in this segment is likely to be between 150 and 250 GW by 2020.

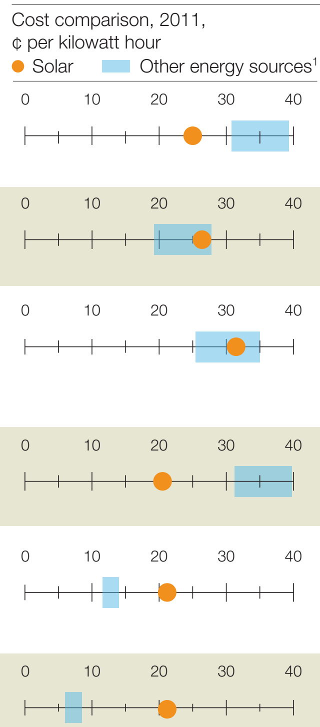
[2] Levelized cost of energy is the price at which electricity must be generated from a specific source to break even.
[3] At these levels, solar power would represent about 2 to 3 percent of power generated globally in 2020, which would nearly equal the projected total demand for power in Africa in 2020.
[4] The rule is designed to mitigate the risk that distributed generation might pose to the stability of the power grid. In 2011, the threshold was increased to 50 percent from its earlier level of 15 percent.

Exhibit 2

Solar power is approaching a tipping point in a number of customer segments.

Photovoltaic solar power

	Customer segment	Cumulative market potential,[2] 2012–20, GWp (gigawatt peak)	Timing of viability
1	**Off grid:** applications in areas with no grids (eg, Africa, India, Southeast Asia, and parts of Middle East)	15–20	Now
2a	**Commercial and residential, good sunlight:** developed markets in sunbelts (eg, Australia, California, Italy, and Spain)	150–250	Now
2b	**Commercial and residential, moderate sunlight:** developed markets with moderate solar yields (eg, Canada, Denmark, Germany, Netherlands, and United Kingdom)	65–120	2012–13 and beyond
3	**Isolated grids:** small local grids primarily fueled by small diesel generators; large latent demand (eg, Africa)	25–30	Now
4	**Peak capacity in growth markets:** growth markets; large power investments (eg, Africa, China, India, and the Middle East)	150–170	2013–14 and beyond
5	**New large-scale power plants:** growth markets; large power investments (eg, China, India, and the Middle East)	Marginal	2025 and beyond



Total market potential = 400–600 gigawatts
(compared with 2011 installed base of 65 gigawatts)

[1]Alternative to solar power in given segment--eg, for residential customers, price for power from grid.
[2]Adjusted for implementation time.

Source: US Energy Information Administration; McKinsey analysis

2b. Residential and commercial retail customers in areas with moderate sun conditions but high retail electricity prices. A wide range of countries and regions fall into this segment, including parts of Europe and the United States, Japan, Canada, and some countries in Latin America. As in segment 2a, barriers to growth include access to low-cost financing and the ability to dramatically reduce customer-acquisition costs. New entrants from the security, cable, or broadband industries could leverage their existing customer relationships to acquire customers at a significantly lower cost than existing players. If the barriers are addressed, potential demand in this segment could range from 65 to 120 GW by 2020. (See the sidebar "Potential evolution of solar-PV capacity in the United States" for details about likely PV penetration in the country through 2020.)

3. Isolated grids. Small grids fueled by diesel generators require an LCOE of between $0.32 and $0.40 per kilowatt hour (kWh) to be economically attractive. These primarily provide power to remote villages in Africa,[5] India, Southeast Asia, and parts of the Middle East. We estimate that demand in this segment is already 25 to 30 GW. The current barrier to deployment is the limited availability of low-cost financing in non-OECD regions.

4. Peak capacity in growth markets. To be economically attractive, new solar-power plants used at periods of peak capacity require an LCOE of $0.12 to $0.14 per kWh. The largest potential for this segment lies in markets where substantial new electric-power infrastructure is set to be built (for instance, India, Brazil, the Middle East, and China) or in countries that rely heavily on imports of liquefied natural gas (such as Japan). Greater access to inexpensive natural gas from shale could erode solar economics, but demand may reach 150 to 170 GW by 2020.

5. New, large-scale power plants. New solar-power plants must reach an LCOE of $0.06 to $0.08 per kWh to be competitive with new-build conventional generation such as coal, natural gas, and nuclear. As with smaller peak-capacity plants, large-scale solar plants are most likely to be built in emerging markets that are expanding their infrastructure aggressively, where the cost of solar will be compared with the cost of a new coal, natural-gas, or nuclear plant. Companies must still achieve breakthroughs in manufacturing techniques to reach this cost threshold in solar; once they do, it will take time to implement the advances at scale. Extensive use of solar as an alternative to traditional base-load generation is not likely before 2020, but the segment could reach 110 to 130 GW by 2030, representing only 15 percent of the cumulative new solar build in the same period.[6] Margins will probably be set by the wholesale power price, however, and may be slim as a result.

Across these five segments, distributed rooftop generation is likely to be the dominant source of solar demand in OECD countries; distributed ground-mounted generation is likely to dominate non-OECD countries (Exhibit 3).

In addition to these segments, many entrepreneurial opportunities will arise for new players and investors seeking to develop tailored business models in different markets and customer segments. Sets of companies focused on serving specific segments could emerge, and these players might become regional or even global champions in their chosen niches. For example, a phone company could make a play to

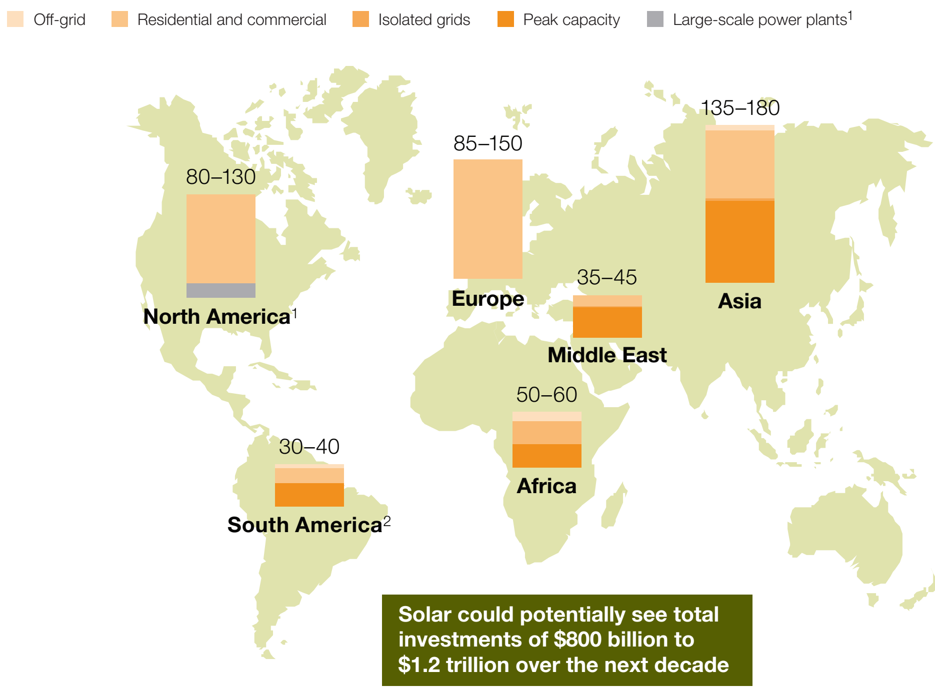
[5] According to the International Energy Agency, there are almost 590 million people with no access to power in Africa alone.

[6] Costs at this level could support the building of new power plants in the United States and some European countries in order to meet carbon-emission targets between 2020 and 2030. However, much will depend on the extent to which low-cost natural gas becomes available in these markets. The analysis therefore heavily discounts the potential in developed markets.

Exhibit 3

Growth in solar PV may transform power markets.

Cumulative capacity additions, 2012–20, gigawatts



[1] Includes 10–20 gigawatts of regulated utility pipeline in the United States.
[2] Includes Mexico.

Source: Enerdata; McKinsey Global Solar Initiative

provide solar power and water pumping in Africa. A global developer could help big retailers such as Wal-Mart and Staples to deploy solar and energy-efficiency approaches in their stores. Home-security companies such as ADT could add solar-power packages on to their existing value propositions.

Given the emergence of these pools of demand, we believe that leading solar companies could have healthier margins by 2015. Prices paid for solar are likely to continue to fall, but sales should rise as solar power becomes economically viable for an increasing number of customers. Additionally, because prices for solar-based power are likely to be set by prices for fossil fuels instead of subsidies (which have been falling annually), margins for leading solar players should increase even as their costs continue to decline.

The global boom-bust cycle in solar PV

Boom: 2005 to 2008

The solar industry was initially nurtured in Germany, Japan, and the United States, then gained strength in countries such as Italy, where government support designed to boost demand helped photovoltaic (PV) manufacturers increase capacity, reduce costs, and advance their technologies.

These subsidies helped spur demand that outpaced supply, which brought about shortages that underwrote bumper profits for the sector until 2008. The focus during this period was developing better cell and module technologies; many Silicon Valley–based venture-capital firms entered the space around this time, often by investing in companies in thin-film solar-cell manufacturing. Valuations for some of the more promising solar-cell start-ups at that time exceeded $1 billion.

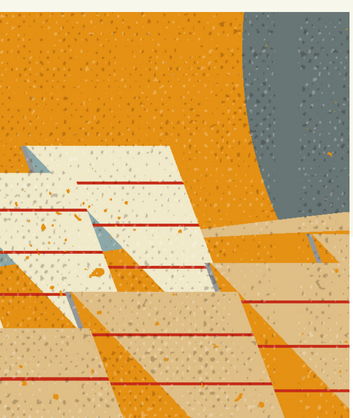
The price to residential customers of installing PV systems fell from more than $100 per watt peak (Wp) in 1975 to $8 per Wp by the end of 2007—although from 2005 to 2008, prices declined at the comparatively modest rate of 4 percent per year. German subsidies drove value creation, with the lion's share of the value going to polysilicon, cell, and module-manufacturing companies in countries that are part of the Organisation for Economic Co-operation and Development.

Bust: 2009 to 2011

Encouraged by the growth of the industry, other countries—including France, Canada, South Korea, Australia, South Africa, India, and China—began to offer support programs to foster the development of solar sectors within their borders. Chinese manufacturers began to build a solar-manufacturing sector targeting foreign countries where demand was driven by subsidies, particularly Germany. Armed with inexpensive labor and equipment, Chinese players triggered a race to expand capacity that drove PV prices down by 40 percent per year; prices fell from more than $4 per Wp in 2008 to about $1 per Wp in January 2012. We estimate that balance-of-system (BOS) costs declined by about 16 percent per year in this period, from about $4 per Wp in 2008 to approximately $2 per Wp in 2012 (these are more difficult to track, in part because BOS costs vary more than module costs).

The cost curve flattened for many upstream segments of the value chain during this period. For example, costs converged for many polysilicon manufacturers from 2010 to 2012; one force that drove this trend was the entry of players such as China's OCI Solar Power and Malaysia's GCL Solar, which contributed to polysilicon spot prices declining from about $50 per kilogram in 2010 to between $20 and $25 per kilogram today (exhibit). Solar-cell and module cost curves have flattened to similar degrees. As a result, value has migrated downstream to players that develop and finance solar projects and install capacity.

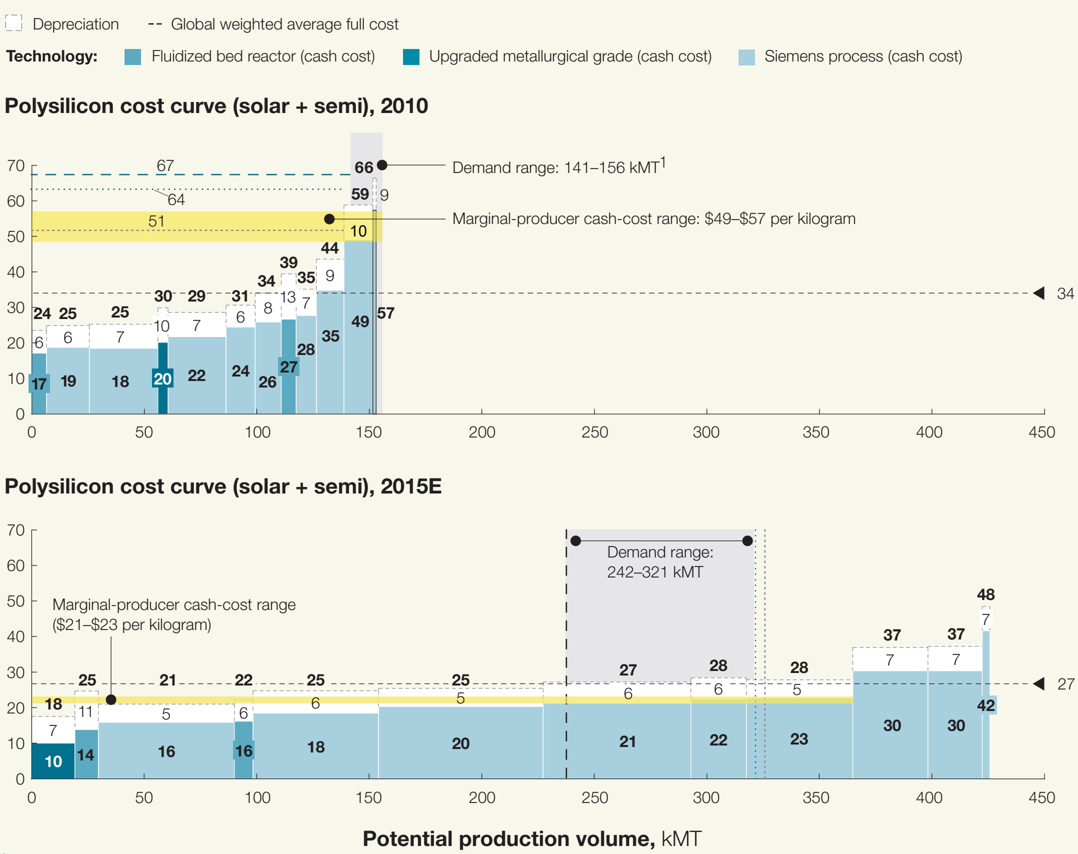
By 2009, venture-capital firms began to shift their new solar investments from capital-intensive solar-cell manufacturers to companies focused on developing innovative downstream business models, such as Solar City, SunRun, and Sungevity.



Exhibit

The polysilicon cost curve illustrates how upstream cost curves are flattening.

Production cost (cash cost and full cost), $ per kilogram



[1]Kilo metric tons.

Source: Expert interviews; literature search; iSuppli; Photon; Bernreuter Research; Solar & Energy; McKinsey analysis

Scale will be crucial for solar manufacturers; to achieve scale, they will also need strong balance sheets

How to win

Against this backdrop, competition among manufacturers is likely to intensify, but our analysis suggests that downstream segments of the value chain will become increasingly attractive. Both upstream and downstream players will have to reduce costs dramatically to succeed, but they will also need to deliver distinctive products and services. Manufacturers can distinguish themselves by developing proprietary technologies; downstream players should focus on meeting the needs of particular customer segments.

Key success factors for upstream players

Scale will be crucial for solar manufacturers. A few years ago, manufacturers needed to have 50 to 100 MW of solar capacity to compete in the PV market; today they need 2 to 3 GW of capacity to compete. To achieve scale, they will also need strong balance sheets. We have identified three steps that manufacturers can take to get there.

Develop or own differentiated and scalable technologies. Companies can capture significant cost advantages by developing proprietary technologies. This is particularly important in manufacturing, where cost curves that were historically quite steep have already flattened significantly and will continue to do so. For example, MEMC and REC have commercialized the fluidized-bed-reactor (FBR) process to reduce the energy intensity of manufacturing polysilicon relative to today's mainstay polysilicon manufacturing process. As a result, the cost of polysilicon is expected to drop significantly by 2015, with the leading players that use the FBR process achieving cash costs of $14 to $16 per kilogram, compared with $16 to $18 per kilogram for leading players that do not use it. Others have developed cell technologies using copper indium gallium selenide that require much less photovoltaic material to harvest the solar energy than crystalline silicon technologies; these new technologies could therefore be less expensive.

Drive operational excellence in manufacturing. Manufacturers should examine every operational step to identify opportunities to reduce costs. They should consider adopting lean production approaches, implementing category-based procurement processes, developing strategic relationships with suppliers, and streamlining their supply chains. To drive operational excellence, leading players often recruit experienced managers from highly competitive industries such as automotives, electronics, or semiconductors. Manufacturers can increase productivity by 30 to 40 percent by pursuing these types of initiatives. They can also develop advantages by adopting practices from other industries to increase their productivity. For example, Taiwanese and Korean companies are applying low-cost approaches for manufacturing solar technologies that were originally developed for manufacturing semiconductors and liquid crystal displays.

Address balance-of-system costs. Solar components excluding PV panels—such as wires, switches, inverters, and labor for installing solar modules—represent more than half the cost of a solar system. These components are collectively referred to as the "balance of system" (BOS), and BOS manufacturers could significantly reduce their costs (and thus lower costs for the whole industry) by implementing techniques—such as modularization, preassembly, standardization, and automation—that are common in mature industries. BOS manufacturers could also reduce industry costs by increasing the durability of the components—for example, by developing technologies that significantly extend the lifetime of inverters relative to the 7 to 10 years typical today.

Large manufacturing companies may have the scale to excel at reducing costs and improving product performance, but they sometimes lack the capabilities needed to understand and fulfill customer needs. Incumbent manufacturers could seek to strengthen their positions by acquiring or partnering with companies that are closer to customers and that can support the development of tailored solutions.

Key success factors for downstream players

Since the bulk of the market in the next 5 to 10 years is expected to be in distributed generation, we focus here on downstream distributed-generation companies. These companies should focus on serving high-value customers at low cost. To do so, companies must know their customers well: they need to understand the solar conditions in the areas in which customers are located, the space customers have available for solar applications, the level of power they consume at different times of day and throughout the year, the amount they pay for power, and their ability to finance purchases. These companies must also reduce the cost of acquiring and serving customers.

Develop targeted customer offerings. Large commercial customers are likely to prefer suppliers that can install and operate solar systems across a global network of sites. Providers will also increasingly be asked to develop specialist solar applications—for example, direct-current water pumps and mobile-charging units, or applications that combine solar with LED lighting. IBM uses solar applications to power its high-voltage, direct-current data center in Bangalore. Off-grid applications in emerging markets need robust equipment that is easy to install without sophisticated engineering and construction equipment. Companies could partner with local project developers to gain access to reliable distribution channels and secure access to finance for projects that carry risks specific to emerging markets. They could also partner with companies that already deliver products and services. For example, Eight19, a solar-PV start-up, partnered with SolarAid, a nonprofit, to provide Kenyans with bundled products and services that include solar-powered LED lighting and phone-charging options. Customers pay for the services as they use them via scratchcards validated through a text-message service. These products are inexpensive to manufacture, and the innovative pay-as-you-go approach enables partners to address some of the financing challenges that might otherwise stymie their efforts to serve poor communities.

Minimize customer-acquisition and installation costs. In the residential segment, acquisition costs for pure-play solar installers in places such as California vary from about $2,000 to more than $4,000 per customer. Acquisition costs are significantly lower in Germany, but best practices that have enabled German companies to reduce costs are not always transferrable given the regulatory environment and the lack of feed-in tariffs in the United States. For players in the United States to sufficiently reduce acquisition cost per customer, companies should minimize door-to-door sales efforts and prescreen potential customers for creditworthiness. Digital channels provide opportunities to meet marketing goals at a lower cost than traditional approaches allow. Companies may also be able to reduce acquisition costs by striking partnerships with companies in other sectors: for example, home builders, security companies, broadband providers, or retail power providers. They can reduce installation costs by optimizing logistics, predesigning systems, training employees to improve their capabilities, and clearly defining standards.

Secure low-cost financing. Many companies are partnering with other organizations to gain access to low-cost financing. MEMC's SunEdison joined with First Reserve, a financial provider, to secure a large pool of project equity. SolarCity secured funding from Google to finance residential solar projects, enabling Google to receive tax benefits in exchange for owning electricity-producing solar assets. Other potential innovative approaches include solar real-estate investment trusts,[7] which allow retail investors to provide funding for solar projects or offer options that let distributed-generation customers pay for their solar investments via their monthly utility bill. The cost of capital is often the most crucial factor determining returns on solar projects. To succeed in downstream markets, companies need strong

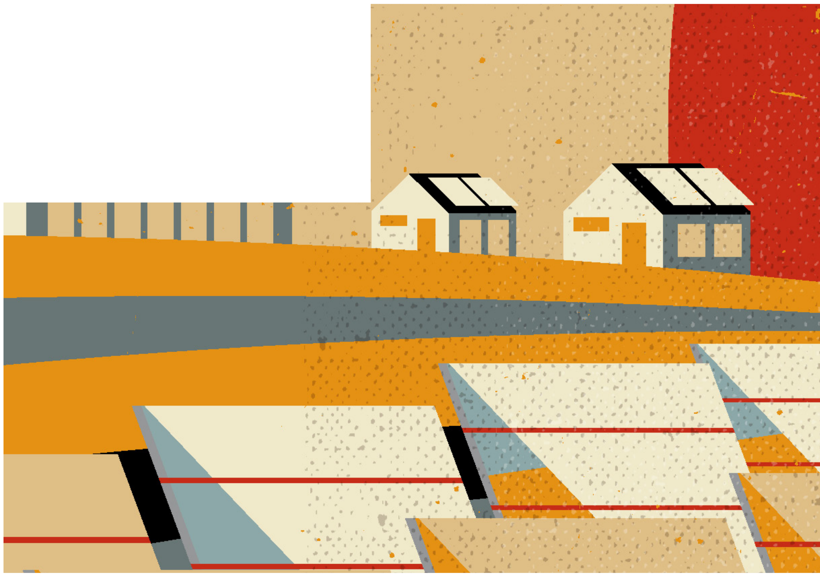
[7] In general, a real-estate investment trust (REIT) is a company that owns (and typically operates) income-producing real estate or real estate–related assets. REITs provide a way for individual investors to earn a share of the income produced through commercial-real-estate ownership without actually going out and buying commercial real estate. Solar REITs rent roof space to companies and utilities that can install and manage solar panels on top of buildings.

capabilities in project finance—indeed, the entities that structure solar investments often achieve better returns than the companies that manufacture or install modules. Companies are increasingly likely to turn to institutional investors, asset-management firms, private-equity firms, and even the retail capital markets to raise the sums required to finance expected demand for solar, which could add up to more than $1 trillion over the next decade.

As the solar investment pool swells, financial institutions, professional investors, and asset managers are likely to be drawn to the sector, since solar projects that are capital-heavy up front but rely on stable contracts will become attractive in comparison with traditional financial products. New types of downstream developers and investment products will emerge to aggregate low-cost equity and debt and to structure financial products with risk-return profiles aligned with the specific needs of institutional investors.

• • •

The solar industry is undergoing a critical transition. The rules of the game are changing, and many current players could face significant challenges as the industry restructures. But those who believe the solar industry has run its course may be surprised. Solar companies that reduce their costs, develop value propositions to target the needs of particular segments, and strategically navigate the evolving regulatory landscape can position themselves to reap significant rewards in the coming years.



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