

California's Rising Electricity Prices— Death Spiral or Breakthrough?

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Will California's electricity price hikes trigger a death spiral for its power utilities—and a breakthrough for disruptive power technologies worldwide?

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Price increases always generate responses by competitors. Price increases always generate responses by customers. Now California regulators are implementing the largest electricity price increases in the history of the state, as high as 49 percent for large industrial users.

Will these higher electric prices so lower the entry barriers for new and possibly disruptive technologies that they will begin seriously competing in energy markets much sooner than generally expected? As customers respond to these increases by migrating to these new competitors, will they eventually cause such large losses in sales for the traditional utilities that the burden of covering the remaining fixed costs might trigger cycles of increasing electric prices—and so more cycles of customer losses? Are we about to enter a death spiral for the traditional utilities and through this creative destruction see the rise of a restructured power industry more prepared for the twenty-first century? A powerful argument can be made that, indeed, we are and that we should be closely watching what is happening in California because the coming changes will reverberate around the world.

The First Piece: Rising Energy Prices

Three major trends that are now aligning could drive these huge structural changes. The first is the California rate hikes, which have only just begun, and which already have echoes in the western region and some northeastern states [see exhibit1]. California's prices will stay high and almost certainly rise even further over the next several years.

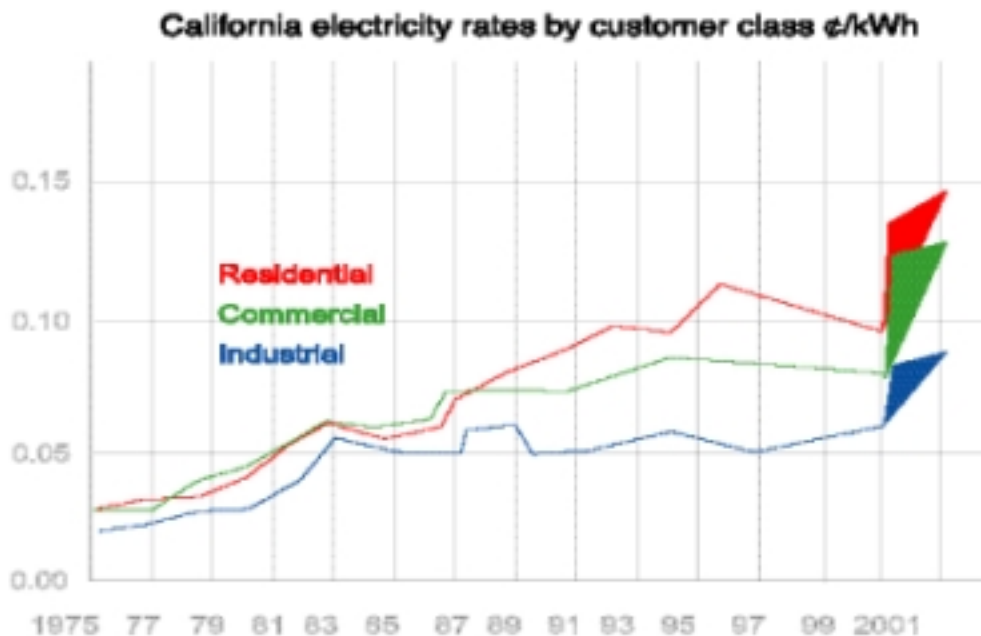


Exhibit 1

Average rate increases approved by the Public Utilities Commission taking affect June 1, 2001: Residential—0% to 37%, commercial 37% to 41%, industrial 30% to 49%.

For starters, billions of dollars will need to be collected simply to cover the power already purchased from 2000 and 2001. Even if these costs are spread via a financing mechanism tied to state bonds or taxes, they will still be high and only make the price increases last longer. On top of that, it will likely take a year or two to get sufficient generation built in the state and thus high and unstable power costs may extend well into 2002. Billions more could easily be added to the existing bill. Over the long term, as California rebuilds its generation base, the cost of power from new plants will likely exceed the cost from older plants that are fully depreciated, keeping prices relatively high. If most of these plants are fired by natural gas, then there is always the risk of fuel-related price spikes which will can be alleviated by more pipeline capacity. Building these pipelines will take some time. Fuel prices will certainly fluctuate based on other supply factors, but keeping them lower over the long term will require more transmission infrastructure to allow competition to work its magic.

Not only are these rate increases large, but they are spread in such a way that those customers most likely to have competitive alternatives (heavy users and large industrial and commercial customers) are getting the biggest hits and will likely be the first to shop around. As utilities lose these customers, those remaining will have to share the burden of the utility's remaining fixed costs, such as the cost of distribution and transmission assets, depreciation of old plants, and some management costs. With the added cost of new generation and possibly escalating fuel costs, it is hard to imagine a long-term scenario where the price of power purchased from traditional utilities could significantly decline.

That means there will be much more money spent on power in California for at least the next several years. The difference in the cost of power for California between 1999 and 2000 was more than \$15 billion (see exhibit 2). Imagine if even 10 percent of this revenue would have been available to kick-start an emerging industry that is already hungry for growth?

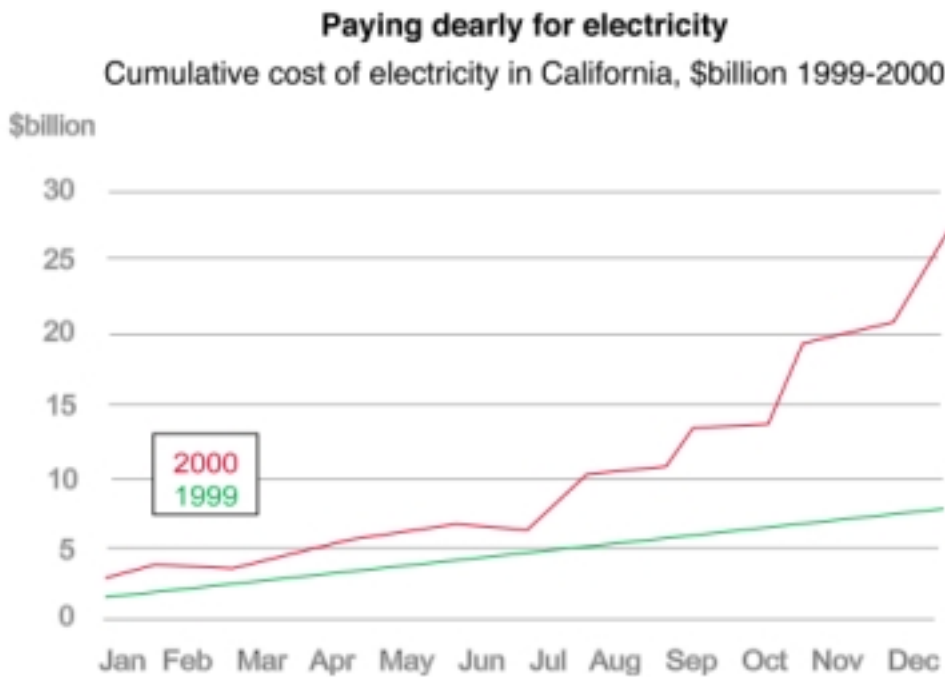
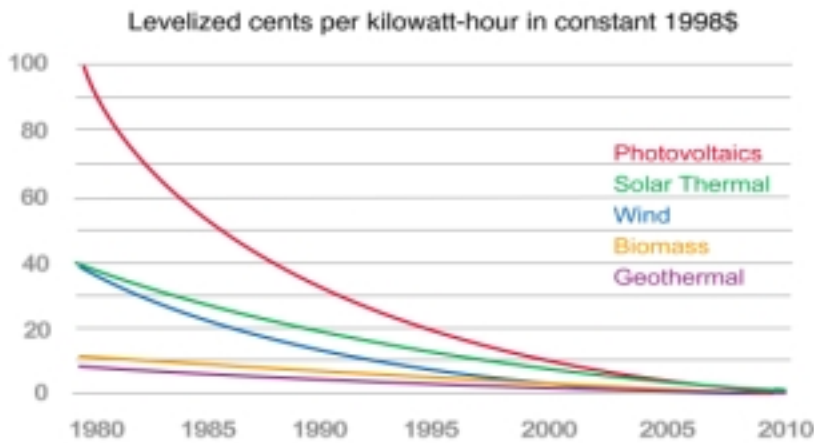


Exhibit 2

With this kind of swing in prices, imagine if only 10% of the increase was available annually for alternative energy, distributed power and other innovative approaches. It would certainly be enough to kick start change.

The Second Piece: Declining Costs of New Energy Technologies

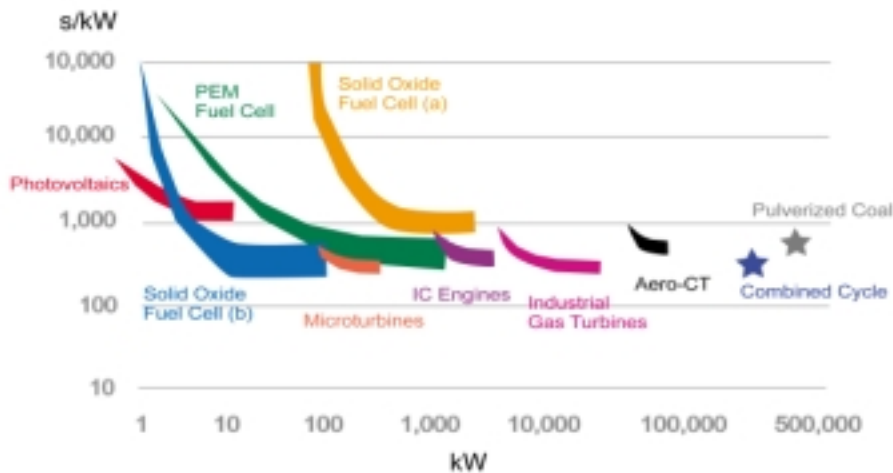
This leads to the second major trend: the declining cost trajectories of new energy producing technologies such as microturbines and fuel cells [see exhibit 3]. Rising prices for electricity will hit the level needed to pay for a range of new technologies that have been unable to seriously enter the market without subsidies because prices have been too low. Skeptics may argue that fuel cells and microturbines have been around for a long time and haven't live up to expectations. What is different now is the amount of investment pouring into these technologies from major players outside the old government and utility R&D programs. All major automotive companies are investing in fuel cells, and companies like Proton Energy have cashed in IPOs for millions in investor funds. Capstone Energy, a world-class microturbine company supported by investment from the computer industry, already has a market capitalization in excess of \$1 billion. This is a new game.



Source: DOE

Exhibit 3

For EPRI chart: Further technological innovation in the products themselves and in the manufacturing processes will help lower the costs of distributed technologies over the next decade according to the Electric Power Research Institute.



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Source: EPRI

There are hundreds of small companies in the alternative energy market space investing in R&D and marketing to build customer awareness [see www.poweronline.com/BuyersGuide/Companies]. In addition, huge firms with impressive track records such as Enron, General Electric, ABB, Siemens Westinghouse, Alstom, Bechtel, and Williams have already targeted movement into this market as major long-term strategic initiatives, backed up by millions of dollars of investment. These companies, supported by many smaller players, want to shift the power industry to a more distributed energy structure where ownership and control of energy-producing assets fall outside the traditional utility structure.

There are also many vibrant companies working on new approaches to energy efficiency and energy management. A combination of cheap sensors, more sophisticated metering, price transparency and signaling, and software systems on both the sell and buy side will eventually make headway in changing how power is consumed. Time-of-use and real-time pricing regimes will become more common, allowing energy users to manage their costs better and allowing new alternative energy suppliers to become more responsive to customer needs. These new companies may be able to make new products that compete beyond pure cost by delivering value-added features. In an era of black outs, reliability has become extremely important. Sellers of new energy technologies are beginning to get a more sophisticated understanding of the energy users total cost considerations. Costs associated with operating losses in production runs, down time for customer service, and losses in worker productivity sometimes dwarf the costs of simply purchasing energy. For some customers, understanding the total value proposition is the key. Many of the potentially disruptive technologies are better able to offer features such as higher power quality, increased reliability, increased control, mobility, and environmental benefits that may counter slightly higher energy production costs [see exhibit 4].

Closing the gap that can ignite power industry restructuring

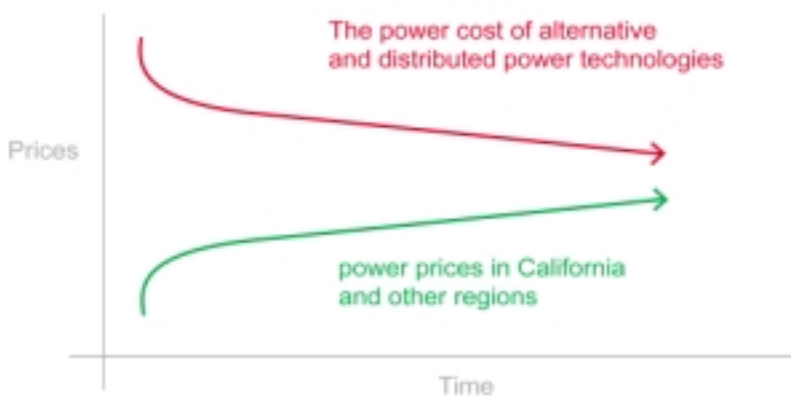


Exhibit 4

Even if these two do not cross, other non-price features may be sufficient to push new technologies into the market place sooner rather than later. These features might include: power quality, increased reliability, finer levels of control, mobility, environmental impacts and space requirements.

Concentration on price alone as the criteria in customer decisions is the perfect way to fall into the trap explained so well by Clayton Christensen in *The Innovators Dilemma* [see exhibit 5]. It may be true that currently only a few customers are willing to pay premiums for some of the features suggested above. But Christensen argues that over time features thought to be outside those expected by the majority of the market become the new standards—sometimes very quickly. The up-and-coming technology comes close enough in expected performance and price to the incumbent but also

provides enough added value that the customers take a leap to the new. That's the shift that could happen in energy in the coming years.

In most cases the incumbents in the energy market, the utilities, lack either the management, technological and marketing expertise, or the service infrastructure to enter the new markets and compete with the innovators who are blazing the new trail. In California, this will be especially true. When the California utilities emerge from bankruptcy (or extensive state control) they are likely to find quickly moving markets and steady customer losses, yet have very few products, services or capabilities to respond.

The Third Piece: Government Rule Changes

If that weren't enough, there's the third major trend to watch: the legislative agenda in California and other states to open up the industry and stimulate distributed energy for environmental reasons and to foster more competition. Within California a good mix of entrepreneurs, engineering consultants, research labs, and interested regulators (for example the Public Interest Energy Research program run by the California Energy Commission) see new alternatives as a way to improve the environment and strengthen the long-term economic competitiveness of the state. This is also happening in other states [see exhibit 6 www.eren.doe.gov/distributedpower/states.asp]. As the rules change, the business environment will too. And that changing environment may hasten a new utility death spiral.

Talk of a death spiral for the traditional electric power industry was also heard in the early 1980s with the advent of competitive generation. This came after the enactment of the U.S. Public Utilities Regulatory Policies Act of 1978, which initially opened up the U. S. market for non-utility-owned power generation. Despite the talk, the spiral never happened, though big changes did come about: significant consolidation in the industry, the formation of large generation companies (sometimes spun out from traditional utilities), experiments with new regulatory practices, and the rise of new forms of energy trading. Prices during this early period of change actually declined or remained stable, partly because of real cost reductions from consolidation, new efficiencies, or regulatory imposition. The price-driven death spiral was largely forestalled — until now.

This time the situation is very different and the death spiral scenario is more probable. This time there are higher prices for energy, more investment from outside the industry into innovative energy technologies, and active regulatory changes that continue to open the market even more. In short, there are new players with new skills and capabilities for whom change is part of their core strategy. This time around, the utilities must beware.

California's Global Repercussions

The convergence of the aforementioned trends are enough to force deep structural change in the California energy market. But what starts in California, and spreads to other parts of the U. S., could become the leading edge of power industry restructuring worldwide. A strong case can be made that California, alone, could provide enough economic incentive to start up new industries. The state of California, by itself, is the fifth largest economy in the world. With its high energy prices, it should provide adequate sales volume to allow companies to generate profits and funds for reinvestment in R&D and product development. Other high-priced regions like the northeastern states in the U. S. will also provide sites for new installations and pilot projects.

Many of the innovative and potentially disruptive technologies can lower their costs by gaining manufacturing efficiencies that arise with higher levels of demand. With higher revenues more resources can be poured into R&D to increase competitiveness. The U.S. and other industrialized countries have higher total energy demand and relatively lower prices on a global basis. If new technologies find a foothold in those markets, they can more easily enter higher priced markets in developing countries.

Moreover, beachheads in the global market may first come in specific industries where non-price features are as important as price. For example, industry-specific applications like Internet server farms, high tech factories, vital data management systems, and fabrication processes where quick spoilage of production is expensive need the feature of reliability more than low prices. Such industries exist all over the world given that manufacturing and production are globally dispersed. These new energy industries might find very receptive consumers, especially given the poor competition in some of these markets, which are often dominated by state-controlled utilities. Just as wireless phones went around state controlled telecommunications companies to provide better service to more people at a faster rate, distributed power and other alternatives could do the same.

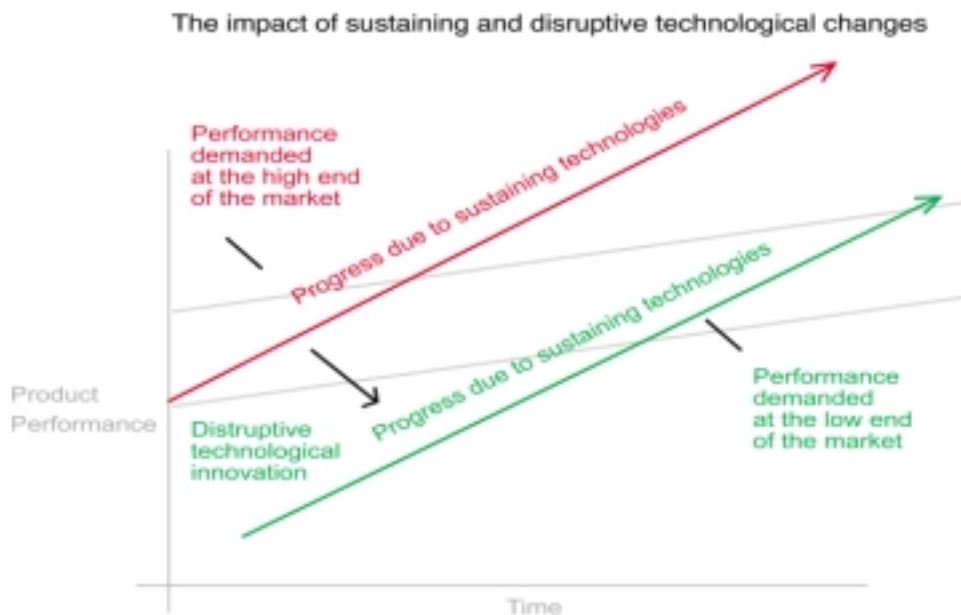


Exhibit 5

Alternative and distributed energy technologies that are currently out of the performance range for broad application. They will find lower hurdles to market entry due to price increases from traditional power sources. With new investment, new technologies will have a chance to become cost competitive as well. As other non-price features become possible and important they will have a chance to enter the market in a disruptive fashion. The current performance band is dominated by cost and ease of use (i.e., flip the switch).

The Cost of Misreading the Future

Some may argue that, far from following California's example, many states and countries are now backing away from deregulation in hopes of avoiding California's mistakes and, in particular, its high prices. True, some moves may forestall the structural changes for a time as, for example, regulators try to protect the old structure and its remaining customers. Some energy cost increases may be hidden in the tax structure temporarily. However, this sleight of hand and postponing should not last for long. As these states' power plants age and need to be replaced, as their industries compete on a

national or international basis, and as their demand grows, their power infrastructures will have to join the modern age. New technologies and the competitive companies providing them will be waiting—if not knocking down the doors.

California, despite all its troubles, is more likely to ignite a much needed change in electric power markets. Those who snicker at California as a comedy of errors to avoid are misreading an important glimpse of the future. The underlying factors which triggered California's admittedly flawed steps toward deregulation must still be dealt with somehow, someday. The old energy producing system is still broken; it is still too dirty, too expensive for the value delivered, and too slow to innovate.

The long-term implications of California's missteps may be the trigger for a massive shift toward the power system of the twenty-first century. The large, vertically integrated and centrally controlled power systems dominated by giant companies offering few choices is entering its final phase. They will be replaced by a system with many more players, offering many more choices. Cheap, mass-marketed, flip-the-switch power may remain available in some form in the future but it will be augmented with better products and services. Some of this energy might be more expensive, but will deliver a better overall value by addressing a deeper set of customer needs and wants. This is a better future for almost everyone who uses energy, which is all of us. Bring on the creative destruction!

The California legislature is considering several new laws with significant implications for distributed resources

April 2001—The California legislature is considering several new laws with significant implications for distributed resources. Proposed laws address various facets to increased use of distributed resources that are cost-effective and environmentally- sound.

Key bills include the following:

- SBX1 35** Entitled the Omnibus Distributed Energy Resources and Clean Electricity Act of 2001 provides for “a comprehensive framework for use and management of distributed energy resources.”
- SBX1 9** Requires nondiscriminatory treatment of customers installing new distributed resources and requires utilities to include distributed energy resources in system planning.
- ABX1 37** written to “foster development of emerging renewable technologies in distributed generation applications.”
- ABX1 64** authorizes “ third party agreements to implement feasible onsite electrical generation for state-owned facilities.”
- AB 75** requires cost-based standby charges for electricity end-users that install “micro generation.”
- AB 1085** provides for “direct transactions” between electricity suppliers and users.
- AB 1735** addresses mostly air emissions related issues.