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Authors

Rosen, Kenneth T.
Howard, Amanda L.

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**THE CALIFORNIA ENERGY CRISIS:
A LITTLE TOO MUCH KELP**

By

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**KENNETH T. ROSEN
AMANDA L. HOWARD**

WALTER A. HAAS SCHOOL OF BUSINESS

**FISHER CENTER FOR REAL ESTATE AND URBAN ECONOMICS
UNIVERSITY OF CALIFORNIA AT BERKELEY**

**Kenneth T. Rosen, Chair
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The California Energy Crisis: *A Little Too Much Kelp*

Kenneth T. Rosen

Amanda L. Howard

Working Paper 01-274

January 2001

Executive Summary

California's energy imbroglio has multiple origins and far-reaching implications, for Silicon Valley, the California economy, the West and potentially for the national economy. To help us understand the severity of the situation, we isolated six elements that collided with bad luck (and a little too much kelp) to produce a Stage 3 Alert situation.

The precarious financial status of California's private utilities is really a consequence of **"botched" deregulation**. The deregulated system first allowed/ required utilities to sell a substantial portion of their power generation capacity to pay off debt, and second mandated a gap between retail rates and wholesale prices, limiting the amount charged to consumers without placing a similar control on the costs faced by utilities. The twin factors of 'transmitter' status and consumer rate caps ultimately resulted in \$12.7 billion of accumulated debt and near-bankruptcy condition for PG&E and Southern California Edison.

Skyrocketing wholesale rates, a byproduct of deregulation and steep increases in the cost of natural gas, are a second major contributor to the power crisis. Wholesale prices increased more than 1,100 percent in eight months, and in 2001 remain at record levels. The possibility of some form of price collusion among power generators has not been ruled out by the Federal Energy Regulatory Commission.

An inadequate supply of new power plants together with a shortage of available imports is another factor in the current quandary. California has built no major plants since the mid 1980s. The western region in general has been lax in adding to power generation capacity, despite sizeable population growth. Compounding the problem of insufficient new supply, the western United States endured one of the hottest summers on record, which intensified demand for electricity, while rainfall in the region was significantly below average, which reduced existing hydroelectric production capabilities.

Not only has new supply been limited, **California's power generation facilities are old and the state's electricity transport infrastructure is unreliable**, resulting in increased maintenance-related plant downtime and grid bottlenecks during periods of peak demand; the majority of operating plants in California are more than 40 years old. During the second half of 2000, an abnormally large percentage of plants were off-line for maintenance and upgrade, contributing to speculation that power generators have manufactured scarcity to inflate prices.

Although demand for electricity in California has increased, it is not, as many have surmised, at the root of the energy predicament. The rate of growth of California's power consumption has been modest (1.2 percent 1990 – 2000) relative to the 1980s and to its western neighbors. Demand for electricity during the 1990s expanded by an average of 24 percent in the West excluding California, compared with absolute growth of 10.7 percent during the same period in California. **This expanded demand for power outside of California**, together with external supply constraints, has reduced the amount of electricity available to California for import.

Domestic exports actually doubled during the summer of 2000, such was the appetite for electricity beyond the state border, while imports declined modestly, exacerbating the supply shortage and pushing up wholesale prices. It is this fragmented combination of elements that has made California particularly vulnerable to an outside shock: increased demand without accompanying increases in new supply; reduced import levels; increased exports; inefficient and off-line plants; and limited hydroelectric capacity. As a result, when a January storm forced large beds of kelp into the cooling pipes at the Diablo Canyon plant, the subsequent reduction in output pushed California over the edge and into a Stage 3 crisis.

Proposed solutions to the energy "challenge" must address four issues: paying for past power, paying for present power, paying for future power and securing an adequate

supply of power.¹ Some mixture of revenue bonds and state electricity purchases will likely remedy (at least temporarily) the first three components of the crisis. However, securing a reliable supply of power through 2002 remains unsolved. To-date, aggressive conservation programs are the state's primary hope for averting continued blackouts. Unfortunately, at least some of that conservation may be unscheduled, as businesses exit California in pursuit of dependable electricity and lower rates elsewhere.

The energy crisis will be resolved. However, the cost of California's lack of foresight may linger in the form of persistent debt and reduced economic growth, locally, regionally and nationally.

i

¹ Governor Gray Davis. February 8, 2001.

Overview

"Thirty-five million residents of the nation's most populous state and the world's seventh largest economy are being urged to watch the Super Bowl in groups to avoid rolling blackouts." New York Times, January 25, 2001

The energy crisis in California makes headlines daily, yet its tangled origins continue to confound even the most knowledgeable participants. In this paper we attempt to diagram the nature of the crisis, outline potential solutions, and assess the implications for the California economy, the regional economy and Silicon Valley. The crisis is particularly difficult to understand because it is the result of many factors operating in tandem (Figure 1, Appendix 1). Broadly, we identify six elements that together have created an electricity emergency in California: 1) a poorly designed deregulation program, 2) a sharp rise in energy and wholesale electricity prices, 3) inadequate supply of new power plants in California and a coincident shortage of electricity in western states, 4) grid unreliability and poor coordination of maintenance and upgrade of aging power plants, 5) considerable increases in demand for electricity *outside* of California caused by strong economic and population growth, and 6) an increase in electricity exports from California. We address each of these contributors in the following sections.

Poorly Designed Deregulation

Deregulation has been a "colossal and dangerous failure." --California Governor Gray Davis

What prompted deregulation? In the 1980s, a number of power plants were built at tremendous cost to the utility companies but never opened because of safety and environmental regulations. In 1996, searching for a way to pay for these excess costs led to a proposal for deregulation. Deregulation allowed the utility companies to sell a large percentage (64 percent) of their power plants to private companies to pay for the billion

dollar losses associated with the stranded projects.² Deregulation therefore shifted the function of the utilities from power generators to power transmitters. Deregulation also:

- Reduced residential rates by 10 percent and put a freeze on retail rates through March 31 2002, but did not require a similar cap on wholesale prices/ margins
- Prohibited the utility companies from entering into long-term supply contracts
- Required most wholesale power to be bought and sold through the Power Exchange (PX) on a “day-ahead” basis; the PX used a single price for *all* power sold, determined by the highest bid necessary to “clear the market,” or equate supply with demand. Electricity needs arising from unforeseen “day-of” demand were to be purchased through the Independent System Operator (ISO); the ISO purchased “day-of” power at whatever price necessary.
- Required the utilities to open transmission lines to cogeneration sources and alternative energy firms.
- Did not do anything to directly encourage adding to the supply of new power plants, (although deregulation did encourage increased use of renewable energy sources).
- Did nothing to promote coordination in the maintenance and upgrade of old plants.
- Was designed around expected electricity surpluses.

The result was a partial deregulation of the energy sector that did not provide supply-side incentives (other than possible price movements), long-term stability, or flexibility. In the fall of 2000, the combination of inadequate supply, a steady increase in the demand for energy, a surge in wholesale prices, and a cap on the rate charged to consumers led to a financial crisis among the utility companies. Adding to an already precarious situation, the Diablo Canyon power plant was forced to cut production on January 11 because of an inundation of kelp in the cooling pipes, driving California into a Stage 3 shortage-of-electricity Alert and precipitating the rolling blackouts that have affected more than two million businesses and households.³

² The retained plants use nuclear or hydroelectric power to generate electricity; all natural gas plants were sold.

Sharp Rise in Energy and Wholesale Prices

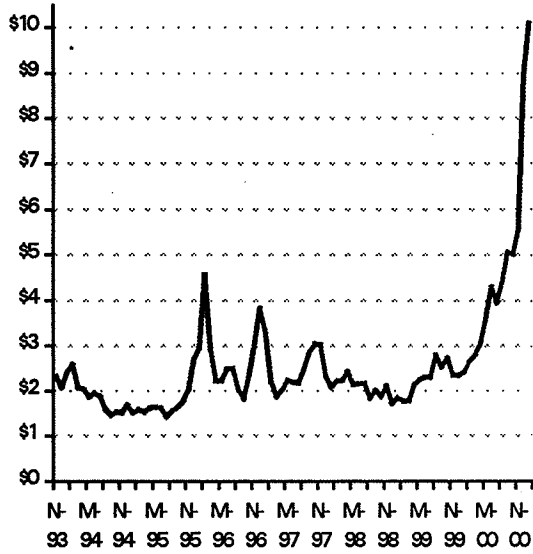
The cost of generating power has risen dramatically since April 2000 because of an increase in raw materials and wholesale prices. The price of natural gas tripled between January and December 2000, reaching a record average of \$8.95 per thousand cubic feet (mcf); on December 27, prices reached an unprecedented \$10.10 per mcf. (Figure 2) The sharp rise in natural gas prices coincides with steady growth in natural gas consumption. (Figure 3) After declining almost 25 percent in the early 1980s, the use of natural gas has grown more than 20 percent in the 1990s and more than 55 percent of California's power plants use natural gas (100 percent of the projects under review in California are natural gas powered).⁴ Although energy prices have risen by a massive amount, the rise in the wholesale price of electricity has been even more spectacular, growing more than 1,100 percent in eight months (from an average of \$27 in April 2000 to an average of \$309 in December 2000). (Figure 4) With limited supply and no long-term price contracts, the marginal supplier determined the price charged to utilities. A highly non-linear pricing event occurs in a shortage situation, which can result in price exploitation. **The FERC report states that "...at least some of the June price spikes appear to be attributable to market power...".** California utilities suffered not only from a rise in the price of raw materials but also from an exploitative market environment in which power plant owners were able to charge exorbitant prices because of scarce supply. In fact, selling electricity to the California utilities has been so profitable that companies outside the power producing business have entered the market. In the Northwest, three aluminum companies, with low-cost long-term energy contracts, have closed their factories to sell that 'cheap' power at a huge mark-up to PG&E and SCE. Although PG&E and SCE are paying power generators between \$150 and \$1,500 per megawatt-hour of electricity (compared with a 1998 - 1999 average of \$29 per MWH), they are only allowed to charge consumers an average of \$60 to \$70 per megawatt-hour.⁵ The outcome is \$12.7 billion of accumulated debt, a junk bond rating, and near-bankruptcy status.

³ A Stage 3 Alert is triggered when electricity reserves fall within 1.5 percent of demand.

⁴ Approximately 90 percent of the proposed power plant projects in the U.S. are natural gas powered.

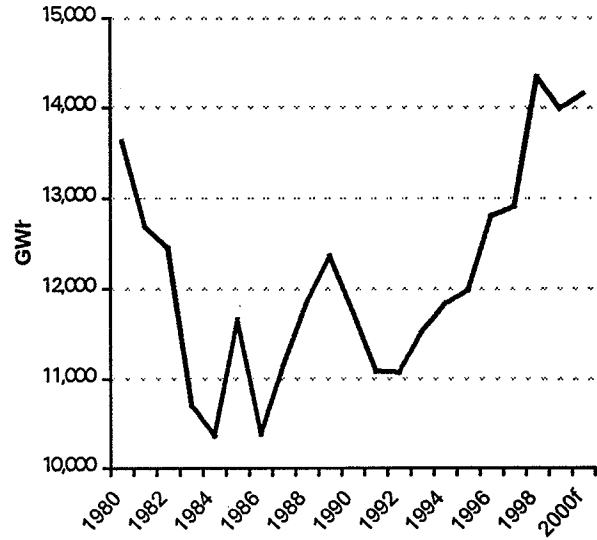
⁵ Average includes residential, commercial, industrial and "other" rates.

Figure 2 Natural Gas Prices
November 1993 - December 2000



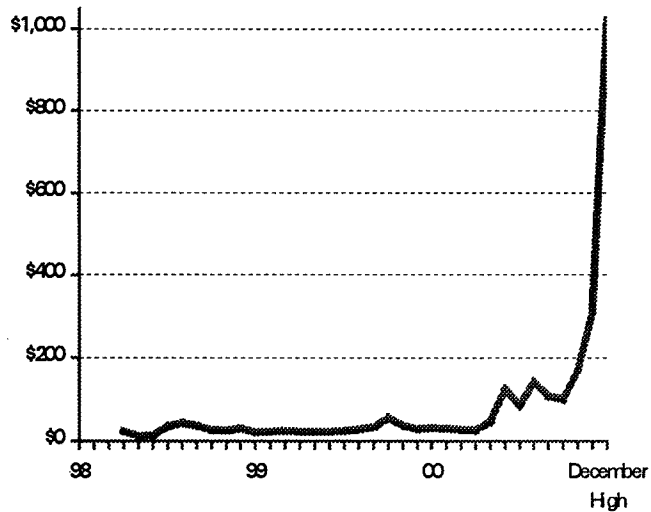
Source: Haver Analytics, Inc.

Figure 3 California Natural Gas Consumption
1980 - 2000



Source: CA Energy Commission

**Figure 4: Wholesale Cost of a
Megawatt Hour of Electricity**



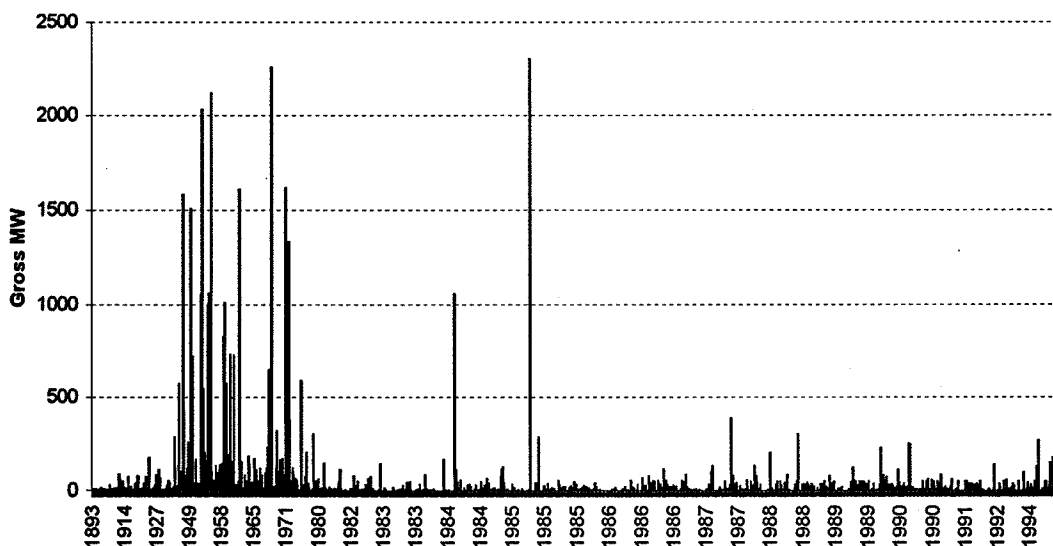
Source: California Energy Commission

Inadequate Supply-- In California, In the West-- and Excessive Dependence on Imports

Fierce environmentalist and resident protest, thick bureaucracy, a pro-conservation government stance and a surplus supply of power in the late 1980s and early 1990s provided little incentive for companies to invest in new plants. As a result, little new supply was added during the decade of the 1990s and no major plants have been built since 1985. (Figure 5) Whereas under a regulated system, the government could mandate the development of excess capacity and encourage the use of a variety of energy sources, the current partially deregulated system relies on profit-centered independent operators to anticipate the market's electricity needs. According to the Energy Commission, it will not be until 2003 that the state is expected to have enough capacity to meet peak demand, assuming the current infrastructure remains on-line. Four projects, all of them powered

by natural gas, are currently under construction, which will add 2,900 MW to California's power generating capacity by July 2002, easing but not fixing the internal shortage situation.⁶ Therefore, in the near-term, excess demand must be met with conservation and electricity imports. On average, California imports between 17 and 20 percent of its electricity, primarily from western states. However, record heat (NOAA lists summer 2000 as one of the top 10 hottest summers on record in the West), rapid population growth (in excess of 50 percent in Nevada, 30 percent in Arizona, 17 percent in Oregon and 18 percent in Washington during the decade of the 1990s), and low water levels in western states' hydroelectric systems (November and December 2000 were the third driest months on record) have reduced available import supply.⁷ The Federal Energy Regulation Commission (FERC) notes that hydro generation outside of California was 23.2 percent below 1999 levels in June 2000, resulting in a 32 percent reduction in scheduled imports from the Pacific Northwest. This shortage of available imports together with PG&E and Southern California Edison's (SCE) growing insolvency has made export states' generators and authorities reluctant to sell to California, further aggravating the supply crisis.

Figure 5: Power Plants Online 1893 - 1999



⁶ Fourteen projects (all of them natural gas) are under review, which could add as much as 15 percent to California's capacity (8,015 MW), beginning in 2003.

Source: California Energy Commission

System Unreliability and Maintenance Coordination

California's electricity deficit has exposed the power system's fragility and susceptibility to a shock. When a storm forced huge beds of kelp into the cooling pipes at the Diablo Canyon nuclear plant near San Luis Obispo, operators were forced to cut output to 20 percent. So precarious is California's power substructure that a partial disruption at a single plant sent the state into Stage 3 Alert. Notice of rolling blackouts also underscored the vulnerability of Path 15, the state's main north-south transmission line. The blackouts have affected Northern California more dramatically than Southern California because Path 15 cannot handle the same capacity as the grids to the north and south, resulting in periodic transmission bottlenecks, often at times of peak demand. On January 22, the ISO reported that Path 15 was once again "congested and unable to deliver the power to Northern California where it is so desperately needed." For 2000, the ISO declared system emergencies on 88 separate occasions, compared with five in 1999 and 12 in 1998. California's alarming exposure to unforeseen events, like an unexpected influx of kelp, is compounded by (and partly the result of) a set of aging power plants that require a considerable amount of maintenance. Nearly 60 percent of California's power supply is generated by plants that were built between 1893 and 1969. (Table 1) A summer 2000 FERC report states that "an increased level of unplanned outages at generating plants is another key factor limiting available generation supply in 2000."⁸ Because of the separation of plant ownership from transmission line control, there is little coordination of plant maintenance or upgrade. As a result, approximately 20 percent of California's power supply was off-line during summer and fall 2000, compared with an average of 11 percent. In August 2000, a period of peak demand, plant outages increased 461 percent relative to 1999. Although age, a heavy summer load, and

⁷ Between April 1990 and July 1999 population increased 50.6 percent in Nevada, 30.4 percent in Arizona, 16.7 percent in Oregon and 18.3 percent in Washington. California's population increased 13.8 percent during the same period.

⁸ "Staff Report to the FERC on Western Markets and the Causes of the Summer 2000 Price Abnormalities"

lack of coordination may account for the unusually large percentage of plants off-line, the FERC Staff report further states that it cannot eliminate the possibility that “...owners could be withholding by taking plants out of service at critical times to drive up prices.” Frank Wolak, a member of the ISO’s Market Monitoring Committee, also finds the percentage of inoperative plants suspect, “One of the things we expected with deregulation was incentive to keep plants well-maintained. Instead, it’s profitable to keep them out of service because it creates scarcity that pushes up prices.”

Table1: Age Distribution of Power Plants

Decade		Gross MW	Percent of Total
1890	–	6.8	0.01%
1899			
1900	–	99.3	0.18%
1909			
1910	–	383.3	0.71%
1919			
1920	–	899.2	1.66%
1929			
1930	–	163.1	0.30%
1939			
1940	–	3,841.9	7.19%
1949			
1950	–	15,483.2	28.6%
1959			
1960	–	9,959.3	18.4%
1969			
Subtotal		30,856.9	56.9%
1970	–	5,983.6	11.09%

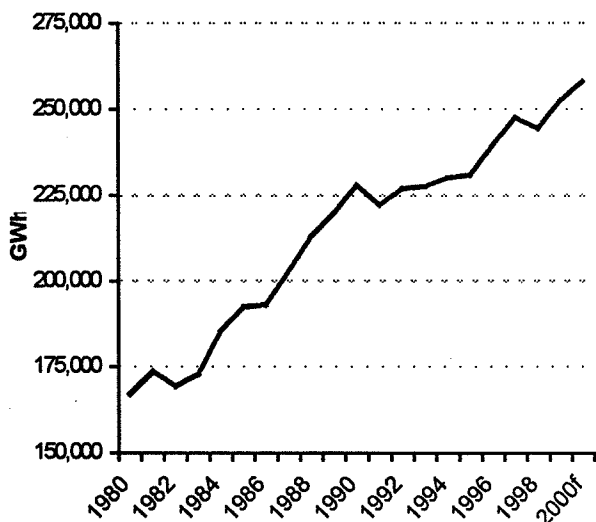
1979			
1980	–	13,430.9	24.78%
1989			
1990	–	3,758.0	6.93%
1999			
Total		54,206.6	100%

Source: California Energy Commission

Increased Demand Outside of California

Although demand for energy has increased in California, partly the result of an expansionary economy and population growth of 13.8 (1990 – 1999), the rate of growth in consumption pales in comparison to the 1980s. (Figure 6) In the decade from 1980 to 1990, demand grew at an annual rate of 3.2 percent, compared with 1.2 percent between 1990 and 2000; even during the 1995 to 2000 boom, demand grew at a slower annual 2.2 percent rate than in the 1980s. In fact, sales volumes traded through the Power Exchange (PX) market actually declined two percent during the summer of 2000 relative to the same period in 1999. (Table 2) The FERC notes that in 2000 “...peak hour demand...for the latter part of the summer in the Cal-ISO area...fell slightly over 1999,” (such a decline may also be attributable to increased demand for power in the Pacific Northwest and a reduced level of imports to California). Furthermore, California ranks the third lowest in per capita energy consumption, indicating that conservation efforts (and

Figure 6: California Electricity Consumption
1980 - 2000



perhaps above-average utility rates) have been successful in reducing demand. (Table 3) In other words, although demand expanded more rapidly during the second part of the 1990s decade, it is not the true culprit of the energy crisis. Rather an ill-designed deregulation program, which did little to encourage new supply, collided with the surge in natural gas and wholesale prices, reduced capacity and increased demand (an average total increase of 24 percent 1990 – 1999) in the western states that export to California and an unforeseen kelp-induced shut-down at Diablo Canyon.⁹

Source: California Energy Commission

Table 2: Electric Sales Volumes 1999 versus 2000

Month	1999 Volume (MWh)	2000 Volume (MWh)	Percent Change
June	15,792,596	17,219,837	9.04%
July	18,941,466	18,245,771	-3.67%
August	19,212,069	17,782,911	-7.44%
September	17,122,621	16,413,002	-4.14%
Total	71,068,751	69,661,515	-1.98%

Source: California Public Utilities Commission

⁹ Residential consumption in New Mexico and Nevada increased 36.3 percent and 34.8 percent in May 2000 relative to 1999 and recorded similar double-digit increases in June 2000. California Public Utility Commission. Fall 2000.

Table 3: State Per Capita Energy Consumption

<i>Highest Per Capita Energy Consumption</i>	BTU	Average Rate MWh	Residential
Tennessee	21,185	\$60.30	
Florida	20,420	\$70.70	
Alabama	19,643	\$70.10	
South Carolina	19,456	\$70.50	
Washington	19,291	\$50.20	
<i>Lowest Per Capita Energy Consumption</i>	BTU	Average Rate MWh	Residential
New York	7,533	\$140.10	
Hawaii	7,634	\$160.10	
California	7,750	\$100.50	
Rhode Island	8,610	\$111.40	
New Mexico	8,931	\$80.30	
AVERAGE	14,286	\$80.24	

Source: Energy Information Association

Too Many Exports

An exceptionally hot summer and limited domestic supply would seem to predict an increase in the amount of electricity imported to California. However, during the period

of peak demand from May through August 2000, average California electricity exports doubled, from an average of 1,700 MW in 1999 to an average of 3,384 MW in 2000. (Table 4) At the same time, imports were slightly below 1999 levels for every month of the May through August period, declining an average of 17 percent. The event of increased exports during a period of shortage is counter-intuitive. In a 2000 Staff Report, the California Public Utilities Commission (CPUC) offers one tentative explanation, "...it is reasonable to assume that some portion of the increased exports is coming back into California as Out-of-Market power purchases...this seems to be one clear way that [nearly] the same level of imports could be maintained while California's traditional sources of import power are either declining, as with hydro, or being used to serve native load."¹⁰ The report further suggests that local power generators may be using exports as a form of withholding, to increase scarcity and drive prices substantially higher than marginal cost.

Table 4: Imports/ Exports 2000 versus 1999 (MW)

	May	June	July	August	May – August Average
Imports 1999	7,214	7,471	8,784	8,489	7,994
Imports 2000	6,534	6,593	6,807	6,524	6,615
Amount of Change	(680)	(878)	(1,977)	(1,965)	(1,379)
Percent Change	-9%	-12%	-23%	-23%	-17%
Exports 1999	(1,107)	(1,667)	(2,036)	(1,987)	(1,700)
Exports 2000	(1,831)	(2,995)	(3,846)	(4,851)	(3,384)
Amount of Change	724	1,328	1,810	2,864	1,684
Percent Change	65%	80%	89%	144%	99%
Net Loss to CA 2000 vs. 1999	(1,404)	(2,206)	(3,787)	(4,829)	(3,063)

¹⁰ "Analysis of FERC Order and Staff Report." California Public Utilities Commission.

Potential Solutions Summary

A number of potential partial antidotes to the California energy crisis have been discussed. These solutions are partial because they address the three components of the financial crisis (paying for past, present and future electricity) but do little to resolve the issue of inadequate supply. We broadly outline the current proposals below.

Power-- Past

- To address the \$12 billion deficit the utilities have incurred because of the imbalance between wholesale and allowable retail prices, the government has proposed to issue 'self-amortizing' bonds, paid over ten years, with a portion of each electricity bill (0.6 to 1.2 cents) set aside for repayment.
- Legislators (Republican) *advocate* an equity participation program to compensate ratepayers for their financial support. The proposal assumes that the utilities recover and the warrants can be executed at a profit; proceeds would then be used to help retire these 'power payment' bonds, 'buy' rate cuts, or mitigate rate increases.
- Alternatively, Senator John Burton and other Democrats support a state acquisition of PG&E and SCE's 26,000 miles of transmission lines. Such an acquisition would allow for the much needed upgrade and expansion of the state's electricity grid. However, it is unclear what role the newly solvent utilities would play under such a scenario.

Power-- Present

- To acquire current power, the state has authorized the Department of Water Resources to act as a conduit, purchasing power directly from suppliers under long-term contracts, and feeding it to the utilities in exchange for a portion of consumers' monthly bills.¹¹

¹¹ The state has secured a long-term contract that will provide 500 MW of electricity, or about one percent of California's daily consumption during non-peak periods; by 2003, when California's generation capacity has expanded, this contract is expected to supply a more substantive 5,000 MW of power per day.

- To finance the expected near-term losses associated with such electricity purchases, and to soften necessary rate increases, the state will sell an estimated \$10 billion in revenue bonds, the largest bond program in California history. Philip Angelides, the California State Treasurer, explains, **“The purpose of the bonds is to fill that gap [between wholesale prices and retail rates], not to buy the power...and to smooth out the [rate increases], so you don’t see a spike, but changes over a larger period of time.”** In two weeks, California has spent \$535 million on wholesale electricity purchases, between \$40 and \$50 million per day, or \$1,300 to \$1,700 per MWh. Through long-term contracts, the cost to the state during the next five years is optimistically expected to average between \$120 and \$160 per MWh, significantly less than current spot market prices, but nevertheless higher than existing retail rates. The system therefore is predicated on the expectation that consumer rates will rise (from \$60 to \$70 per MWh) and wholesale market prices will drop substantially as new supply comes online, generating enough additional income for bond repayment.
- Temporary wholesale price caps, although supported by eight of the eleven western governors, have been repeatedly rejected by the FERC, the agency with the authority to impose such limits. The commission has opposed price controls, arguing that “anything that puts disincentives in place, that would work against reducing demand [or encouraging new supply]...has to be looked at very carefully.”¹²

Power-- Future

- To provide longer-term stability, the state will lift the prohibition on long-term contract pricing between power suppliers and power transmitters; the requirement that power be purchased and sold through the PX will be eliminated.
- To address existing debt, accommodate changes in market conditions and shifts in raw materials prices, and to forestall future deficits, the state must increase retail electricity prices. One proposal suggests raising rates only on usage that exceeds 130 percent of baseline consumption, which varies by household, business, region, season. While financing graduated rate increases is appropriate, the consumer must

¹² Spencer Abraham, Federal Energy Secretary.

ultimately bear the full cost of electricity acquisition. A program that subsidizes utility rates would be an improper use of taxpayer resources and unworkable in the long-run.

Power Supply

- To preclude future supply shortages, the state plans to create a “State Energy Agency” (SEA) that can build or acquire its own plants and transmission systems. Such an agency would essentially eclipse the need to mandate minimum reserve requirements for independent generators.
- The SEA should have override authority to push through a crash program of new plant construction and reduce regulatory red tape for independent projects.
- The SEA should encourage conservation and the development of renewable energy sources through a set of tax incentives. In the near-term, reducing demand through higher prices, rebate programs and education is the quickest way to add new supply. Gray Davis has proposed an \$827 million conservation and energy efficiency program, with the improbable goal of reducing electricity consumption by 20 percent in 2001. Unfortunately, at least some of that conservation may be unscheduled, as businesses exit California in pursuit of dependable electricity and lower rates elsewhere.
- In the future, we may see corporate transmission line sponsorship, branded power, the “Cisco” grid, similar to Pacific Bell’s San Francisco baseball stadium sponsorship (PacBell Park).

It is fairly clear at this point that the financial crisis will be solved (at least temporarily), through a program of ‘self-amortizing bonds or transmission line acquisition, state electricity purchases and ‘power payment’ bonds, (essentially a temporary transfer of unavoidable near-term debt). It is also clear that in the long-term, the SEA will provide a cushion against severe supply shortages. While California has proposed a system to keep the utilities alive and pay for current power, where that electricity will come from is not clear. Power plants take an average of 2.5 years to build. Even in an accelerated

scenario, there will not be enough additional capacity to meet peak demand until late 2002. Unfortunately, projects that are currently underway are finding the supply shortage cumbersome. The Sutter Project in Yuba City has been the victim of several outages; "It takes power to build a power plant, and here we were just shut down."¹³

Not only is electricity scarce in California, but supply is limited in most western states. While average regional demand has grown at twice the rate of demand in California (24.0 percent versus 10.7 percent 1990 – 1999), western states have increased generating capacity by only about four percent. As in California, insufficient new supply in the West has been aggravated by unforeseen events, in this case sparse precipitation. In Washington and Oregon, which use hydroelectric power to generate approximately 70 percent of their electricity, low precipitation levels have stranded a number of critical plants. Montana, the fourth largest energy-producer in the nation has watched its surpluses disappear; in the past the state has exported an average of 40 percent of its electricity. Furthermore, insufficient supply (and subsequent reliance on electricity imports) has eroded an already "tenuous relationship" between California and its western neighbors.¹⁴ Mandatory exports to "negligent" California have endangered the Washington and Oregon salmon population, a habitat that the Pacific Northwest has spent billions of dollars to protect. Senator Gordon Smith of Oregon angrily echoes the sentiments of the region, "Frankly, I think my state is being set-up, and I include Washington State, to be an energy farm for California." A combination of aggressive conservation and increased electricity imports will provide only a partial band-aid to the problem of power scarcity in 2001.

¹³ Tom Miller, Project Manager for the Sutter Project in Yuba City, California

¹⁴ Ken Rust, Chief Financial Manager for Utah's Governor Michael Leavitt.

Implications – Bigger before it gets better

“A protracted period of electricity market instability and unreliability could cause us to revisit our rating outlook [for California], as it would produce a more substantial dampening effect on the economy in the long-term.” –Moody’s Investor Service, January 2001

Near-term Potential Gasoline Shortage

California’s electricity crisis could get bigger before it gets better. In the near-term, continued electricity blackouts may have larger ramifications for California’s gasoline-distribution system; outages are affecting pipeline companies that ship fuel to the state. A 30-minute period of unplanned downtime can put a pipeline two to three days behind schedule. Interruptions at Kinder Morgan Energy Partners, GATX Corp, Plains All American Pipeline and Valero Energy (which supplies 10 percent of the state’s gasoline) have delayed deliveries, caused distribution bottlenecks and forced reduced production levels. Inventories have begun to decline at gasoline-distribution centers around California and out-of-state airlines are flying planes with fuller-than-normal fuel tanks in order to reduce the amount of re-fuelling necessary at California airports. Continued interruptions could filter down to the gas station level, where a temporary shortage would push already-high pump prices higher.

California Economic Slowdown

With indebted utilities and scarce supply, California, which has average electricity prices 25 percent above the national average (and overall business costs seven percent above the national average), faces a near-certain increase in rates.¹⁵ (Figure 7) Philip Angelides, the California State Treasurer, comments **“The truth is finally on the table, that the rates will be what the rates need to be.”** Higher electricity prices are like a tax increase, which reduces consumer income by one to two percent, resulting in a proportional reduction in consumer spending. Similarly, a rise in commercial electricity rates increases the cost of production for businesses, making it particularly difficult for small

and medium-sized firms to operate. If these companies cannot pass on the additional costs through higher retail prices, they will be forced to curtail production, accept lower profits or shut down.

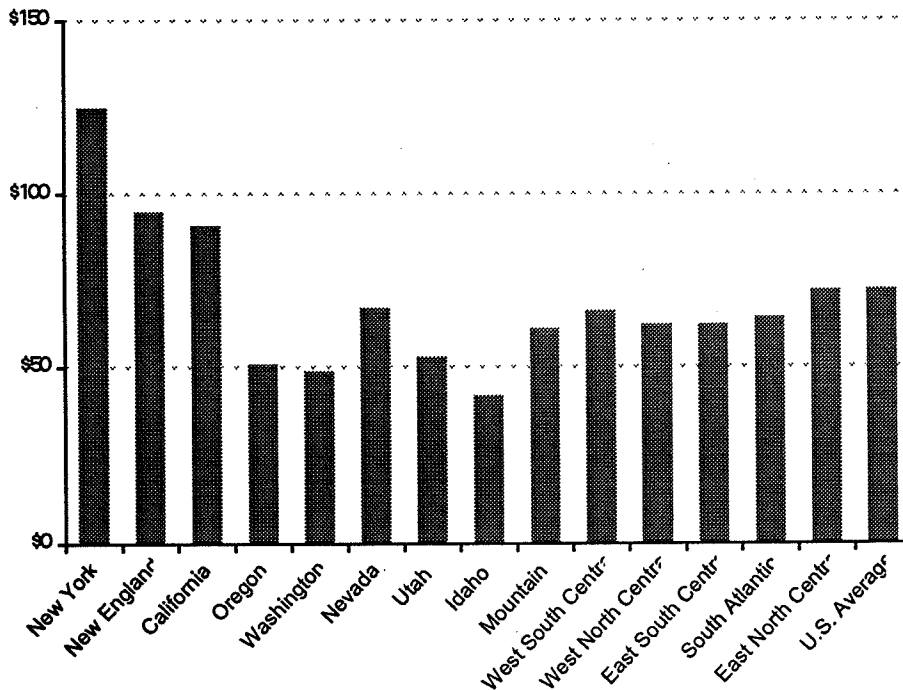
One way that companies have tried to control higher energy costs is through direct long-term supply contracts. In the future however, these contracts may become increasingly scarce. Enron Energy Services (EES), a division of the Enron Corporation and the largest low-cost corporate energy provider in California, recently announced that it will terminate service to its commercial and industrial clients in California (including Cisco, Genentech, Clorox, GTE and IBM, among others) to avoid incurring losses. The division's strategy was to sell power directly to large corporations at a discount by purchasing electricity on the wholesale market. The unpredicted inflated spot market prices have made such a strategy untenable. As a result, these client companies may face rate increases of 35 percent or more; Kaiser Permanente estimates that it may incur \$500,000 per month in additional costs. Furthermore, EES's discontinuation adds to the amount of energy that PG&E and the state must provide; one estimate suggests this amount may be equivalent to the electricity needed to power three million homes.

While the cost of power remains a continuing concern, for larger businesses, and the technology sector in particular, reliability is often more important than price. Craig Barrett, the CEO of Intel, announced that the chipmaker was unlikely to expand in California until electricity became more dependable. In the first three weeks of January, outages have caused a number of industrial companies, from San Gabriel Valley to Fontana, California, to temporarily close factories, lay off workers and shift manufacturing out-of-state. Soletron, an electronic device maker, has temporarily closed six of its 22 factories and laid-off 2,000 employees as it contemplates transferring some of its production to international sites. Unfortunately California's electricity shortage is not temporary. Although three plants are expected to come on-line this summer, they add a paltry 2,000 MW to the states' generating capacity, not nearly

¹⁵ PG&E and SCE has petitioned the Federal District Court to uphold a Federal law that permits utilities

enough additional supply to support peak summer demand.¹⁶ Averting continued outages throughout 2001 will require substantial imports, even greater conservation efforts and a lot of rain. However, imports to California will come under further pressure this summer, as low precipitation levels and below average snowpack (along with increased demand for power) in the Pacific Northwest reduce generating capacity. John Savage, Oregon's Energy Director, sums up the situation, "Our hope is for 75.-degree weather and rain of biblical proportions for the rest of the winter."¹⁷ Meanwhile, higher utility bills, the potential for increases in retail prices and/ or reduced industrial activity could deepen California's nascent economic slowdown. **A sharp deceleration in the California economy, which represents 13 percent of U.S. GDP, could easily upset a vulnerable national economy.**

Figure 7: Average Commercial Electricity Rates per MWh \$¢



Source: Energy Information Association

to pass through to customers most wholesale power costs.

¹⁶ In the western U.S., demand is an average 50percent higher during the summer.

¹⁷ Testimony before the State's Legislature's House Committee on Smart Growth and Commerce. January 24, 2001.

Regional Economic Slowdown

In addition to the regional problem of inadequate supply, and intensifying the potential hazards for California's economy, an epidemic of financial strain is spreading throughout the West, as neighboring states face the same "unmerciful" wholesale market.¹⁸ Although less restricted in terms of long-term contracts, retail pricing and power generation, many western utilities buy a portion of their electricity on the spot market. Sustained record wholesale prices have forced these utilities to propose rate increases of 16 to 50 percent. (Table 5) While California's electricity prices are significantly above the national average, neighboring states' utility bills are 15 to 30 percent below the mean. Governor Mike Leavitt of Utah comments, **"What's at stake is the economic competitiveness of the West."** Not only are California's traditional import states struggling with internal supply, a widening spread between utility cost and retail electricity prices could ignite a regional economic slowdown.

Table 5 Actual and Proposed Utility Price Increases August 2000 – January 2001

Utility	State	Actual/ Proposed			Percentage Increase
Tohono O'odham Utility Authority	Arizona	August 2000 -- Actual			30%
Pacific Gas & Electric	California	December 2000	--	9% – 15% Temporary	
San Diego Gas & Electric	California	January 2001	--	16% Proposed	
Idaho Power	Idaho	January 2001	--	24% Proposed	
Utah Power & Light	Utah	January 2001	--	19%	

¹⁸ Dan Aschenbach, Senior Vice President, Moody's Investor Service

Proposed				
Seattle City Light	Washingt on	January 2001 -- Actual	Reduced Rating	Credit
Tacoma Power	Washingt on	December 2000 -- Actual	50%	

Source: Wall Street Journal, CBS MarketWatch, California Energy Commission

Silicon Valley

The impact of rolling blackouts on Silicon Valley, the nucleus of real-time technology and networked supply chains and part of the force behind California's estimated six percent growth in Gross State Product (GSP) in 2000, will be the most significant bellwether of future California growth. Silicon Valley Manufacturing Group (SVMG), with 190 members, estimated that during the week of January 22, more than 100,000 workers were idled at member companies and more than \$10 million was lost as a result of rolling blackouts. E-commerce companies, relying on dependable websites, can lose more than \$1 million per hour when outages occur. Thomas Weisel Partners estimates that Amazon.com lost about \$500,000 in revenue during a (non-electricity related) 20-minute outage during Thanksgiving. Clearly, these types of losses both in terms of immediate revenue and productivity cannot be sustained. Carl Guardino, president of the SVMG comments that "Nearly every high-technology manufacturer in Silicon Valley has drawn up plans to shift production out-of-state if necessary." It is exactly this invest-or-leave decision that perplexes many companies. If rolling blackouts continue, firms must chose to either invest in significant power generation equipment to keep plants running and employees working, or to begin the process of transferring production to other out-of-state sites. Oracle, the second largest software company in the world, spent \$6 million to build a substation that can carry power directly from the grid to its 1.6 million square feet of office space. Integrated Device Technologies (IDT) is debating whether to spend \$3 million on additional generators that would keep its factory running during an outage. Dave Côte, Vice President of International Marketing for IDT asks, "At what point do [the power outages] make this a good investment for us?" While we anticipate that

electricity outages are not just a January phenomenon, the cost of relocating and disentangling from an internationally recognized hub of technology, innovation and growth will often outweigh the cost of investment in back-up electricity capacity. Nevertheless, as Craig Barret notes, expansion in an area without a dependable supply of electricity is unthinkable. Therefore regardless of the decision to leave California, blackouts will deter corporate expansion, affecting Silicon Valley and California's growth prospects and adding another weight to a decelerating economy.

Conclusion

Electricity is to an economy what food is to a human; without it we die. With an entire region hooked to the same power grid, California's electricity debacle could easily exacerbate a modest national economic slowdown. What appears to be California-specific should be addressed at a national level, acknowledging the size of the California economy and the grim consequences of continued shortages and high prices. The energy crisis will be resolved. **However, the cost of California's lack of foresight may linger in the form of persistent debt and reduced economic growth, locally, regionally and nationally.**

¹ *The power situation in California is constantly evolving. This report represents a snapshot of the electricity crisis through the end of January 2001.*