THREE YEARS AFTER THE CALIFORNIA ENERGY CRISIS: A PLAN TO AVOID FUTURE SHORTAGES

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PREFACE

This report was prepared as part of the Capstone Policy Seminar experience at the Pepperdine School of Public Policy. The Seminar, one of the integral parts of the preparation for students receiving the Master of Public Policy degree, provides students with the opportunity to explore a public policy program in depth and to prepare a set of specific recommendations to policy makers to solve the problem. These reports are prepared by a team of 6-8 students over the course of only twelve weeks, providing for an intensive and challenging experience.

The results of the team's analysis is then presented to a panel of experts in a public workshop setting where the student panelists are given the opportunity to interact directly with the policy professionals, not only presenting their findings but engaging in an exchange of ideas and views regarding the specifics of those recommendations. The policy expert panel for this report included RAND expert Mark Bernstein, Mark Minick from Southern California Edison, and Senior Economist Christopher Thornberg from the UCLA Anderson Forecast.

The School of Public Policy would like to thank our students for their hard work and commitment in preparing this policy analysis. We are proud of your achievement.

EXECUTIVE SUMMARY

California's electricity system is in danger of experiencing future blackouts. Demand for electricity is expected to surpass supply in the near future. The soaring population, increased usage of electronic technologies, and a lack of effective conservation measures are driving the increase in demand. Increases in the supply of electricity are not keeping pace with those of demand. This paper focuses primarily on increasing supply side measures to meet California's future energy needs. While demand side measures are important, particularly in order to keep consumers in touch with the issue, they will fall short of supply side measures in their ability to effectively close the fast approaching demand-supply gap. California could experience another energy crisis as early as 2006. This paper recommends policy measures to create both short and long-term supply; thereby, averting the prospect of leaving Californians, once again, in the dark and in debt.

The status quo of California's energy picture has improved significantly from the drastic condition it was in during the midst of the 2000-2001 crises. However, much more needs to be done in light of demand-supply projections. California needs to broadly restructure its electricity system. There are currently twelve plants scheduled to come on line by March 2006, but only three are actively being constructed. Infrastructure issues are being addressed and bottlenecks are being fixed, but the California Energy Commission (CEC) acknowledges that without more attention to the grid, there could be future transmission failures. But most importantly, the system is mired in a quasi price and production regulated state that does not provide incentives for companies to establish new power plants in California. This paper examines the options available to increase production and access to greater supply.

First, we identify policy priorities against which we could measures the options to reorganize California's energy landscape. We determined that measures taken to change California's energy situation must meet a specific set of criteria. They must create a reliable and economically efficient energy supply that does not depend too heavily on any one method of production. They must not cause unacceptable damage to the environment, and must provide energy in a safe and socially responsible manner, including respecting private property rights and insulating lower income consumers from high prices.

Then we consider several varied approaches with reference to our defined criteria. The four approaches are: production provided solely by the state, a completely unregulated energy market, mandated in-state private production, and a market rate driven model with the appropriate amount of regulation.

We conclude that a system based on market rate prices with minimal regulation best fits our criteria. We recommend measures that will create a foundation for competition in energy production and supply, primarily by gradually lifting retail price caps and by giving consumers the ability to choose their energy producers. Lifting retail price caps will create incentives for new production and/or for utilities to purchase power from out-of-state generators. Eliminating the disconnect between retail and wholesale prices will thus create a market-based price system and a responsiveness between demand and supply that is currently lacking. In helping to create such responsiveness, we recommend implementing real-time pricing mechanisms to be installed over the long term. We also recommend simplifying the plant approval process and reorganizing the regulatory agencies, in an effort to ease barriers to the entry of production. Lastly, we recommend using tradable energy credits as a method for utilities to more easily satisfy current legislation, which requires the use of diversified energy sources.

California needs more energy supply. It will have to pay for it either through higher prices or higher taxes. If instituted, our recommendations will create a competitive market where the stability and consistency of regulation will create confidence in investors and consumers. Not only will California be confident its lights will stay on, but, while prices to consumers will rise initially, a competitive environment may eventually provide the benefits of reliability, lower prices, better service and choice of energy sources, as is enjoyed by other similarly structured states.

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ABBREVIATION CHART

Following are abbreviations commonly used in this paper (see Appendix B for agency function):

CEC	California Energy Resources Conservation and Development Commission/California Energy Commission
CEQA	California Environmental Quality Act
CPA	The California Consumer Power and Conservation Financing Authority (California Power Authority)
CPUC	California Public Utilities Commission
CSA	California State Auditor
DOJ	U.S. Department of Justice
DWR	Department of Water Resources
EOB	Electricity Oversight Board
FERC	Federal Energy Regulatory Commission
IOU	Investor Owned Utility
ISO	California Independent System Operator
MW	Megawatt
PG&E	Pacific Gas & Electric Company
PX	Power Exchange
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric Company

INTRODUCTION

This paper provides a policy overview of California's energy situation. It provides analysis into the factors that set the stage for the energy crises that occurred in California during 2000 and 2001, examines the current situation, and looks to preventing future blackouts. In addition, it reviews the political, economic, and environmental climates present in the state and evaluates options for California's future. Finally, it offers a strategy to help reconfigure the complicated landscape of the California energy market.

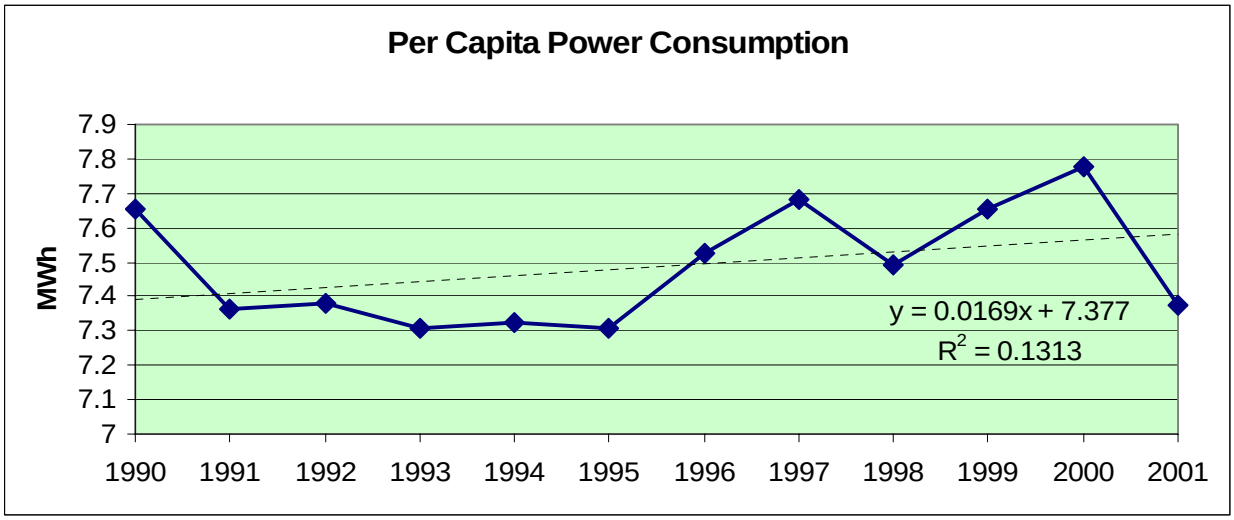
THE SUPPLY AND DEMAND GAP IN CALIFORNIA

In the simplest terms, California's demand for power is outpacing its supply. The rate of growth in energy consumption is greater than the rate of growth in energy production. Conservation measures have slowed the rate of closure, but have not stopped it.

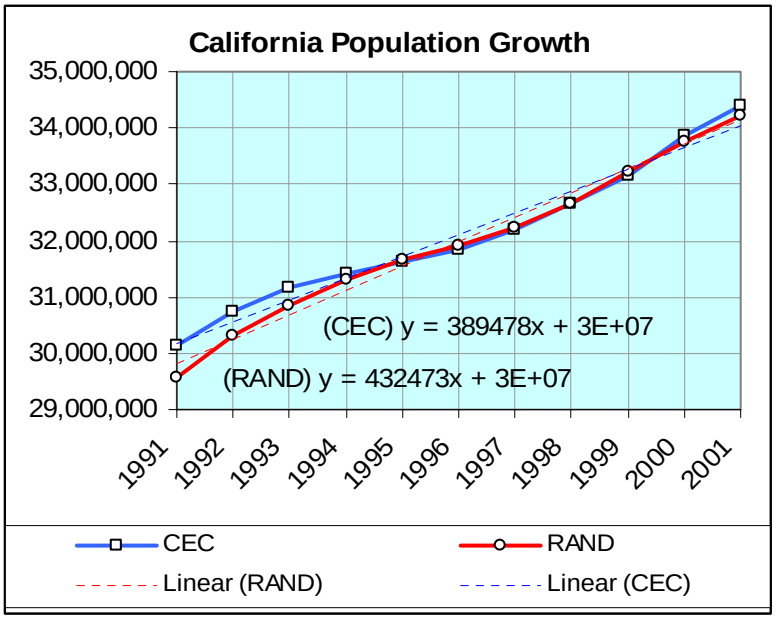
THE DEMAND-REDUCTION ARGUMENT

Much is made of demand-reduction techniques, such as conservation, and how these measures will help California prevent future energy crises. Unfortunately, demand reduction cannot solve California's energy problems, it can only delay them. On a per capita basis between 1992 and 2001, energy consumption increased at a rate of roughly 16-kilowatt hours per year per person, from 7.36 to 7.38 megawatt hours. Though this additional consumption is not much on an individual basis – it is approximately equivalent to watching an additional 16 DVDs on a home theater system, 32 more hours of internet surfing on a home computer system, or baking 15 more potatoes in a toaster oven (one at a time, not simultaneously)[1] – individual electricity consumption is only one part of the equation.

[1] "Homefficient Energy Sense – Usage Guide", *Rochester Gas and Electric Corporation Homepage*, Retrieved March 4, 2004, <http://www.rge.com/EnergyUsage.html>

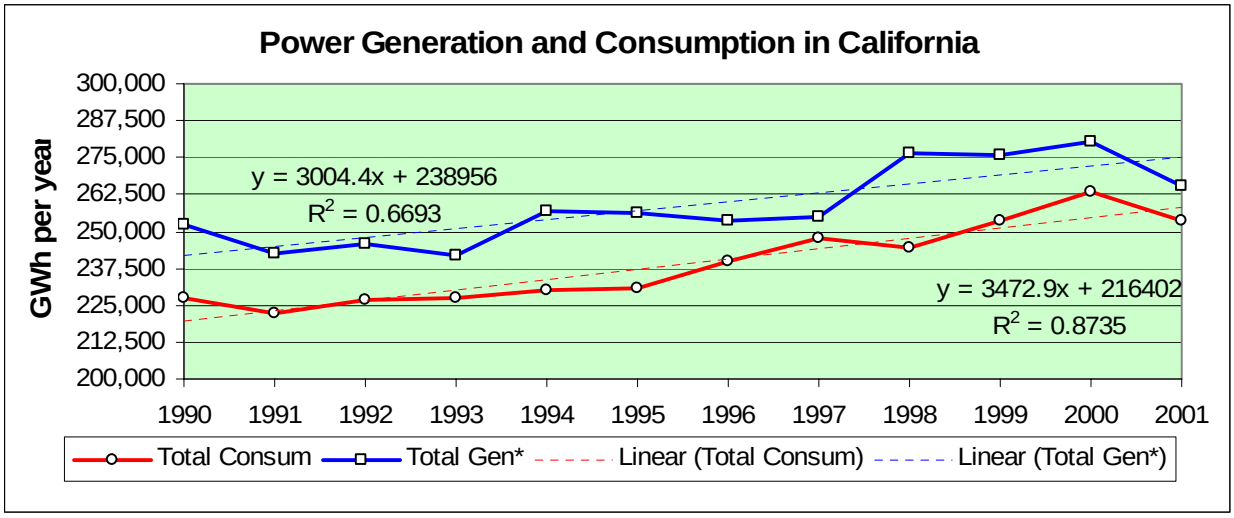


Even if per capita energy consumption levels remained static, the state's population would also have to remain static for demand controls alone to solve the state's energy problems. California's population, however, has been consistently rising. The state's population increased at an average rate of 421,000 people per year between 1992 and 2001. As mentioned above, an increase of an average of 16-kilowatt hours per person per year may not seem like much, but when the state's population growth averages 421,000 people per year, the increase in demand becomes apparent.



THE QUESTION OF CAPACITY

Based on CEC figures, total electricity consumption has increased at a rate of 3,473 gigawatt hours per year, roughly 468 gigawatt hours greater than the growth of capacity.



The picture of capacity is presently shaky in California. In a September 2002 report, the CEC stated that California imports 23% of its energy. (see Appendix C) Clearly California cannot currently support its own power needs locally, and is heavily dependent on power from neighboring states. Should these energy sources become restricted for any reason, California may once again experience serious energy shortfalls. Projections on the rates of energy consumption and generation in California suggest that the state could face a critical shortfall between 2006 and 2008.

The blackouts resulting from the 2000-2001 crisis caused considerable economic damage to businesses and industries nationwide, but reactionary policy further exacerbated the problem by plunging the state into fiscal instability; a problem still being dealt with today.

THE ELECTRICITY IMBALANCE AND BAD POLICY COCKTAIL

The rolling blackouts brought great inconvenience to Californians as it interrupted their normal daily life. In communities throughout the affected areas, lights, computers, fax machines and phones went dead; streetlights flickered on and off; traffic lights, ATMs, classrooms, and entire neighborhoods lost power.

Officials encouraged residents to keep thermostats set at specific temperatures and turn off their computers and lights when not in use. [2]

Blackouts even had the power to threaten people's lives. CNN reported that in Sacramento, a woman and her two children were caught in an elevator between floors when the power went out. The blackouts also have figured in traffic accidents at intersections after traffic lights went out. [3]

In addition to the inconvenience and safety issues caused by the blackouts, businesses were disrupted and consequently lost money. Computer systems of business were threatened; in order to prepare for a blackout all data needed to be saved. Due to refrigeration issues, losses were incurred by the general public, restaurants, grocery stores, and producers of perishable items. Many large companies, such as breweries and steel producers, were forced to halt production and in some cases sent their employees home for a full day. Silicon Valley companies complained that one week's rolling blackouts had cost them millions of dollars in lost production. For example, a three-hour blackout on June 14 cost Silicon Valley businesses over $100 million.[4] Because customers could not place orders online, E-commerce companies that relied on smoothly functioning Web sites, often powered by servers in the San Francisco Bay Area, purportedly lost anywhere from $1 million per hour to $1 million per minute when the power went off.

The blackouts also accounted for potential business losses in California due to the lowering of the state's bonds rating, which reflected a lack of confidence in California's ability to dig its way out of the mess. There were reports of increasing concern, especially among those high-tech corporations in Silicon Valley, with some considering leaving the state for North Carolina and Texas.[5]

Although it is difficult to measure the total costs of these blackouts, it is unquestionably significant. A study released May 9, 2001 by the California Alliance for Energy & Economic Stability projected that

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[2] "Power Grinch Could Steal California's Bright Christmas", *Cnn.com,* December 6, 2000, <http://www.cnn.com/2000/US/12/06/cal.energy.01/>

[3] "Power Loss Complicates Life for Californians", *Cnn.com,* January 19, 2001, <http://www.cnn.com/2001/US/01/19/blackouts.sanfran/index.html>

[4] Gerardo Nebbia, "Blackouts Hit California as Energy Crisis Deepens", *World Socialist Website*, January 18, 2001, < http://www.wsws.org/articles/2001/jan2001/cali-j18.shtml>

[5] Ibid.

electricity blackouts during 2001 summer would conservatively cost California businesses $21.8 billion in lost productivity, reduce household income by another $4.6 billion (a loss of $104 for every one of California's 11.5 million households) and take jobs away from 135,000 Californians.[6] Gray Davis' office estimated the total cost of the 2000-2001 energy crisis at approximately $45 billion. Some consumer advocacy groups claimed it was as high as $70 billion.[7] To put these numbers into perspective, when compared to the state's annual budget of approximately $100 billion, such losses could cover 45% to 70% of the budget, or it could finance the budget deficit for several years.

The energy crisis of 2000-2001 caused losses in productivity, jobs, tax dollars, state fiscal stability and citizen confidence in its government. It is clear that California must adopt new policies to address how it will acquire needed supply in the future while avoiding similar consequences. In addition to devising ways of increasing production of and access to electricity supply, there are a number of issues that need to be addressed when discussing the energy situation in California. These include: environmental concerns related to existing plants and plant construction, perceptions regarding the most appropriate degree of regulation/deregulation for the state, financial implications surrounding the production of power, how the division of regulatory authority affects power generation options in California, and social inequity implications.

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[6] AUS Consultants, "Impact of a Continuing Electricity Crisis on the California Economy", May 3, 2001, p. ii-iii, <http://www.caltax.org/member/taxletter/Reference/AUSStudyfinal.pdf>

[7] Carolyn Said, "Buckets of Trouble: Tracking Down the Billions of Dollars the Energy Crisis Cost California", *San Francisco Chronicle,* April 27, 2003, <http://www.powertothepeople.org/newswire/042703.shtml>

THE HISTORY OF CALIFORNIA'S ENERGY MARKET[8]

In 1996, the California Legislature under the guidance of the California Public Utilities Commission (CPUC), enacted Assembly Bill (AB) 1890 in an effort to restructure, what was at the time, a highly regulated energy market. This action was primarily in response to electricity prices, which had been amongst the highest in the nation. It was also in response to a major shift in the federal energy policy, which was moving toward creating a market-based system.

In 1996, the Federal Energy Regulatory Commission (FERC), which oversees the "just and reasonableness" of rates, terms and conditions of interstate sale and transmission of wholesale power, issued orders aimed at encouraging competition from non-monopoly utilities. It did so by guaranteeing interstate access to monopoly owned transmission lines for all power generating firms through non-discriminatory tariffs, while allowing transmitting companies to seek recovery for sunk or stranded costs associated with providing open access. The order also required monopoly utilities to separate their generation and transmission to create transparency; as well as outlining the role an Independent System Operator (ISO) would play in such a new scenario.

Though the CPUC oversaw retail electricity rates, another factor determined to be causing high prices was the lack of competition, due to the virtual monopoly created by the state's regulated energy system. California's three major investor owned utilities (IOUs), Pacific Gas & Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E), at the time owned most of the state's power production, transmission, and controlled distribution.

AB 1890 sought to bring energy prices down, give consumers an option of companies from which they could buy their services, and thereby get in step with FERC regulations and emerging national free-market competition. It did so by:

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[8] "Energy Deregulation: The Benefits of Competition Were Undermined by Structural Flaws in the Market, Unsuccessful Oversight, and Uncontrollable Competitive Forces," California State Auditor/Bureau of State Audits, Report #2000-134.1 and "California Energy Markets: Pressures Have Eased, but Cost Risks Remain" California State Auditor/Bureau of State Audits, Report #2001-009

- Creating the ISO, a non-profit corporation that controls the statewide energy transmission system. The IOUs were required to transfer control of their transmission facilities to the ISO and likewise the ISO was responsible for reliable transmission of wholesale power to the IOUs.

- Creating the Power Exchange (PX) - a non-profit energy-trading corporation through which the IOUs were required to buy and sell all of their power.[9]

- Requiring the IOUs to sell some of their generation assets.

- Requiring rate reductions of 10% for residential and small business consumers.

- Requiring the CPUC to reject or approve power plant site applications within 12 months.

However, this legislation proved to be extremely complex and required continued state and federal oversight on many organizational levels. Though the CEC received a notable increase in power plant applications, the process to bring them online proved to be lengthy and complicated.

Initially the new structure worked out well enough; however, consumers still did not have many companies from which to choose. After a few years, expectations of benefits from "deregulation" diminished and problems began to manifest. By December 2000, the state experienced rolling blackouts. The reasons for the "market failure" of the new structure could be categorized as implementation flaws of restructuring and are broken down as follows:

- CPUC mandated that the three IOUs sell and purchase all energy through "sequential short term markets" operated by the PX and the ISO. This system encouraged buyers and sellers to manipulate wholesale prices to their advantage through strategic bidding, whereby either buyers deliberately underestimated the amount of power needed or sellers underestimated the amount of energy available for the next day.

- CPUC initially limited the IOU's use of long-term contracts, which could have neutralized the jumps in prices. After the CPUC increased the availability of the long-term contract, some IOUs chose not to use them, which proved to be an expensive choice.

- Because the prices the incumbent IOUs could charge their customers were fixed, they could not pass on the costs of the highly manipulated wholesale prices.

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[9] This was intended to last until March 2002; however, in December 2000 FERC eliminated this requirement. FERC also terminated the PX's tariff taking. As a result, market operations of the PX were suspended in Jan 2001.

- Unsuccessful Oversight. In 1998, groups within the ISO and PX warned the FERC and the CPUC of the structural problems. Neither entity responded fully or expediently to the concerns.

- Intangibles. Extreme weather patterns, increases in natural gas costs, growth in demand, and few plants built in the entire western region to meet population growth and demand, all contributed to increased costs to energy facilities to meet air quality requirements.

Following the rolling blackouts in 2000, the crisis provoked response by the Legislature to develop AB 970, which was passed in January 2001. It was intended to:

- Bring new supplies of electricity online quickly by requiring the Energy Commission and the CPUC to expedite the power plant site approval process (from 1996 to 2001, none of the 12 approved sites had actually come online). AB 970 created 6 month, 4 month, and 21 day approval processes for different types of plants. The site approval process had been lengthy for a variety of reasons – private power companies unfamiliar with approval process planned for bigger plants which took longer to evaluate, public opposition, amendments to applications and lack of agency coordination.

- Address the limitations of the electrical transmission grid including: a lack of transmission lines, particularly lines transferring power between northern and southern California; a congested power grid that increased the costs for wholesale electricity buyers in the form of trigger surcharges; the CPUC's review process for new transmission sites which had taken considerably longer than timelines set by the California Environmental Quality Act (CEQA); and the fact that demand projections and application for transmission projects were the responsibility of the IOUs who had little incentive to be truthful about projections or to create new transmission as both would promote increased competition by other power generators.

- To reduce energy demand by mandating a variety of new energy efficiency programs.

However ambitious the legislation was, it had minimal impact on the crisis. The CPUC began using three new expedited plant siting processes but at the time only one proved to add significant energy for the coming summer. The CPUC did little to expedite transmission line projects, with the exception of minimizing contracting delays. The CPUC and CEC did create and revise programs to increase energy efficiency; however, many of their new measures often depended on voluntary consumer compliance.

More importantly, as this legislation was being formulated, the IOUs were getting deeper into financial trouble. PG&E and SCE asked the Public Utilities Commission for emergency aid for losses they incurred from having to buy wholesale energy at an over-inflated rate and sell it at lower, fixed rates. Their request was rejected, as was their repeated request to increase consumer rates. It was not until January 2001 that the PUC approved rate hikes. However at this point, the companies' financial situations were so dire, the hikes made little impact and the companies' credit had already eroded with power

generators. On January 8, 2001 Gray Davis proposed to allow retailers to buy energy bilaterally, outside the PX. Then, just nine days later, on January 17 he declared a state of emergency when wholesale prices hit new highs and the state had to once again issue rolling blackouts. Shortly thereafter, the state stepped in to purchase electricity on the IOUs behalf – financed by state loans from the General Fund, interim loans from banks, and electricity sales to customers.

The inability of utility companies to pass costs on to consumers had further consequences for California. In response to soaring prices in the wholesale market, the Davis administration negotiated a series of long term contracts with several power companies totaling $43 billion. The average for all contracts over the next ten years was $70/megawatt hour, significantly above the standard market rate. From the perspective of the state at the time, such contracts, as expensive as they were, ensured a stable energy supply with set costs, enabling the state to budget into the future. Essentially, the added costs acted as a safety net against future uncertainty. Power generators, knowing the exorbitant wholesale prices wouldn't hold, were naturally eager to sign inflated contracts.

In the time period since these contracts were signed, most have either expired or have been renegotiated. In an effort to recoup some of its losses and stem future losses, the state resorted to lawsuits against energy and natural gas providers with which they entered long-term contracts[10]. Some voluntarily reworked the contracts; others were named in a series of lawsuits that claimed unfair pricing practices. Some providers then opted to rework the contracts as long as they did not have to admit guilt. Still others decided to fight, because after all the state did sign the contracts. In January 2003, the Federal Energy Regulatory Commission (FERC) settled the suits but they did not award full damages sought by the State, which were approximately $9 billion. The lawsuits did improve the state's position but the long-term contracts in question did come with considerable cost.

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[10]A Consumer/Environmental agenda prepared by William Marcus, Principal Economist, JBS Energy for the Utility Consumer's Action Network, Environmental Defense, The Utility Reform Network, Natural Resources Defense Council, Consumers Union and the Sierra Club titled A Blueprint for Renegotiating California's Worst Electricity Contracts (2001) <http://www.ucan.org/law_policy/energydocs/statecontractrep.htm#_ftn9> named 12 contract holders that accounted for 59% of the long-term capacity contracts entered into by the State. They were: Sempra Energy, Williams Energy, Calpine Los Esteros, Calpine Peakers, Constellation Energy, Coral Energy, Dynegy, Pacificorp, El Paso Merchant Energy, Alliance Colton, Mirant and Morgan Stanley.

CALIFORNIA'S ENERGY MARKET TODAY

At present there are twelve power plants with a capacity of 7,154 megawatt in the planning phase in California. These plants are scheduled to come online between December 2004 and March 2006. Only three plants are actively being constructed. Construction on five of the twelve plants has been placed on hold for various unspecified reasons, removing 37% or 2,640 megawatts from the power capacity expansion. The table below shows the disposition of planned generation plants in California.

Location	mW	Date Approved	Expected Completion	Project Status	% Completed
San Bernardino	1056	3/21/2001	Jun-05	construction	15%
San Jose	600	9/24/2001	Dec-04	construction	5%
Tejon Ranch	750	12/20/2000	Jun-05	construction	49%
Alameda	1100	8/20/2003	Jun-05	financing	0%
Burbank	328	3/5/2003	May-05	financing	0%
Escondito	546	8/6/2003	Aug-05	financing	0%
Vernon	134	5/20/2003	May-05	financing	0%
Antioch	530	5/30/2001	Jun-05	on hold	7%
Burney	500	5/16/2001	Mar-06	on hold	0%
Hayward	600	9/11/2002	Jun-05	on hold	0%
KcKittrick	500	3/21/2001	Mar-06	on hold	0%
Otay Mesa	510	4/18/2001	Dec-04	on hold	5%

http://www.energy.ca.gov/sitingcases/approved.html

TRANSMISSION SYSTEM REPORT

A major part of the energy crisis of 2000-2001 was the inability of California's energy infrastructure to transmit energy from areas of excess to areas of shortage. The weakest part of the energy transmission system or the "grid" is the notorious bottleneck known as Path 15[11], which in times of high demand has

11 "Construction Work Starts on Path 15 Transmission Line", US Department of Energy Press Release, September 24, 2003, <http://www.energy.gov/engine/content.do?PUBLIC_ID=14190&BT_CODE=PR_PRESSRELEASES&TT_CODE=PRESSRELEASE>

limited transmission from southern to northern California. This is one of many shortcomings of the energy transmission system in California. Efforts are underway to improve the grid in California; this is a vital area of concern if California is going to succeed in meeting the supply needs of its residents in the future.

The story of Path 15 is representative of the major changes taking place to aid transmission in California. Path 15 is a system of three 500-kV lines between northern and southern California. This part of the electricity transmission system, which roughly follows Interstate 5, has a section of only two lines near Los Banos, California. A privately funded deal to upgrade the transmission system in this area was successfully negotiated on September 12, 2003. This will add a third line with a capacity of 1,500 megawatts. The California Independent System Operator estimates that the cost for this project will be recovered in four years and that California's residents will save $100 million in energy costs in a normal year.

While significant efforts are being made to upgrade the transmission system in the state, many think that not enough is being done to upgrade the grid. The CEC has stated publicly that California's infrastructure is in need of upgrading if the estimated supply required to sustain California's energy future is to be delivered to consumers. More emphasis must be placed on not only fixing existing transmission infrastructure, but also meeting the transmission needs of new power plants. This will be a major factor in the ability of energy providers to meet the needs of its consumers in the future.

In an effort to address these concerns the CEC has stated that it would like to take over the permitting process of the transmission system in California.[12] This duty currently falls under CPUC jurisdiction and are permitted under CEQA, not the CEC's hybrid system tailored specifically to energy issues. The CEC believes that it could speed up the permitting process of transmission lines and would fix the disconnection between the permitting plants and associated infrastructure. The outcome of this request is uncertain at this time. The CPUC has agreed to make changes to the permitting process, but is resisting giving up control of the process to the CEC.

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[12] "Too Many Cooks? California agencies squabble over methods to improved transmission siting", *Power Markets Week*, September 29, 2003.

RETAIL PRICE CAPS

The prices that IOUs can charge its customers are currently fixed by the state. The CPUC takes input cost and capital cost data from the utilities and determines the rate that they would be allowed to charge to different classes of consumers (residential, commercial, industrial).[13] Fixed prices disconnect consumer behavior from the realities of electricity costs and changes in wholesale prices, allowing for increased, rather than decreased, consumption in a time of acute scarcity. Increased consumption at prices below cost not only leads to financial losses for the state's electric utilities and but can in turn drive wholesale prices up even further. By not allowing the market to determine prices, demand does not self-adjust, which adds to the likelihood of future blackouts.

CONSUMER CHOICE

In September of 2001, the state legislated to reverse the portion of previous restructuring legislation that allowed consumers to obtain power directly from the generator of their choice. Because the IOUs were in such bad financial shape by this time, the move was made to keep more customers from leaving the suffering utilities.

STATUS QUO OF THE CALIFORNIA INVESTOR OWNED UTILITIES

California's IOUs, particularly PG&E, were put between a rock and a hard place in the middle of the 2000-2001 crisis because they could not pass higher costs on to the consumer. The IOUs suffered enormous financial losses during this time. PG&E filed for bankruptcy protection in April 2001 after being 'financially hogtied' during the crisis.[14] At the time, they were the largest utility to ever file for bankruptcy protection.

Today there are major efforts to get the IOUs back to their pre-crisis form, or at least as close to it as possible, given the numerous changes in the California energy state of affairs. In 2004, the Department of Water Resources (DWR) relinquished control of energy purchases for the state's utilities, giving IOUs the

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[13] Lynne Kiesling and Adrian T. Moore, "Movin' Juice: Making Electricity Transmission More Competitive," Reason Public Policy Institute Policy Study #314, September 2003, p. 6, < http://www.rppi.org/ps314.pdf>

[14] "About Face: California Changes Ownership Policy", *Natural Gas Week*, January 30, 2004.

ability to independently procure energy. In addition, IOUs now have more flexibility to secure long-term contracts to help hedge against volatility in the energy market.

SCE and SDG&E also suffered from the crisis, but neither was forced to file for bankruptcy protection. SCE teetered on the verge of filing for Chapter 11 protection, but instead worked with regulators to reorganize without formal protection. They have managed to resume a more normal existence in the post-crisis era. PG&E suffered the greatest financial loss as a result of the crisis; they are the last of the IOUs to get back on their feet.

PG&E's recent emergence from bankruptcy proceedings indicates that the IOUs are almost back to business as usual. However, the settlement did not come without great cost to Californians. PG&E's nine-year, $7.2 billion reorganization plan was approved by a 3-2 vote by the CPUC in December 2003. The consumers, not the shareholders, will receive the brunt of the financial burden under this plan. PG&E's creditors will receive all of their $12 billion dollars debt, an unprecedented occurrence in bankruptcy proceedings; usually creditors will only receive a fraction of the outstanding balance. Many people feel that this plan could be susceptible to legal action because it leaves the ratepayers to foot the bill for the reorganization. At the time of publication of this paper, further legal action was uncertain.[15]

Production and transmission issues continue to hold uncertainty for the IOUs, and therefore California's future. With de-regulation, they were forced to sell many of their production facilities. They still control most of the transmission system in the state. In an effort to secure more supply to meet the needs of Californians, the IOUs are working with the CEC and the CPUC to upgrade the transmission grid. The IOUs are participating in the aforementioned discussions between the CEC and CPUC over permitting issues.

Even in assuming that PG&E's settlement will be final and not subject to further legal action, California's IOUs have effectively emerged from most of the stopgap measures installed during the crisis. Altered regulations, purchase restrictions, changes in price flexibility, and production and transmission issues have all affected the IOUs during the past three years; it has been a dynamic period that is now showing signs of more IOU independence. While their recovery is encouraging, the IOUs will face upcoming challenges from the California energy system in the near future. They will have to be able to react to meet

[15] "Regulators Okay for PG&E Recovery", *The Los Angeles Times*, December 19, 2003.

the increasing demand for and transmission of electricity for an increasing number of California's residents.

ENVIRONMENTAL PERMITTING OF POWER PLANTS IN CALIFORNIA

CEQA was passed in 1970 to act as a system of checks and balances for land use development and management decisions in California.[16] It is widely held that California has the most stringent standards in the country. Although CEQA does not directly apply to every energy project, the act does serve as a basis for the environmental review process for all energy facility construction in California.

The CEC is the state's primary energy policy and planning agency. The CEC was created in 1974 by the Warren-Alquist State Energy Resources Conservation and Development Commission Act (Warren-Alquist Act), and is comprised of a five commissioner, governor appointed board. The CEC's mission is to "assess, advocate, and act through public/private partnerships to improve energy systems that promote a strong economy and a healthy environment."[17] The CEC is responsible for permitting all power plants 50MW or larger, ensuring the plants' compliance with environmental and land use issues related to its construction and operation.

While the CEC does not mirror the formal CEQA process precisely (i.e. the CEC does not prepare environmental impact reports, but prepares Staff Assessments and Committee reports covering the same issues), its permitting process has been determined to be the functional equivalent to that required by CEQA.[18] The CEC is the lead agency for all projects it approves, though the CEC consults with other agencies on the local, state, and federal levels in order to assure compliance with all laws, regulations, standards, and ordinances. Relevant agencies, e.g. the Federal Environmental Protection Agency, State Water Resources Control Board, and United States Fish and Wildlife Service as well as possibly numerous other local, state and federal boards and agencies, must also review each application for compliance. The CEC permitting process encompasses twenty different technical areas, including

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[16] "Overview of the California Environmental Review and Permit Approval Process", Governor's Office of Planning and Research, *California Environmental Resources Evaluation System Homepage,* Retrieved February 16, 2004 from <http://ceres.ca.gov/topic/env_law/ceqa/guidelines/intro.html>

[17] "Mission, Vision, and Values of the California Energy Commission", *California Energy Commission Homepage*, Page last updated December 4, 2001, <http://www.energy.ca.gov/commission/mission_statement.html>

[18] "Energy Facility Licensing Process: Developers Guide of Practices and Procedures", California Energy Commission Staff Report/Draft, November 2000, p. 3.

everything from air quality and water resources, to cultural and socioeconomic factors. The CEC application process for permitting power plants involves seven phases. (see Appendix A)

Once a power plant is approved, the CEC then monitors the project to ensure its compliance with the design, construction, operation, and closure phases as set forth in the conditions of acceptance. After the pre-filing phase, the application process to approve power plants is scheduled to last 12 months. However, the process frequently takes longer than this. In addition to lags in getting plants online following approval, there are a multitude of other reasons for these delays.

The bottom line is that such delays act as a disincentive for investors to look at California as an attractive area to generate power. Essentially, the market becomes skewed away from California. The mission of the CEC is to improve and advocate for energy systems in order to promote a balance between a strong economy and environmental health, one can see the need to implement improvements in the process – improvements that can encourage both a strong California economy and a healthy environment.

EXPEDITED APPROVAL PROCESS

In the midst of the energy crisis in 2000-2001, the Davis administration passed a series of laws and executive orders that provided for an expedited power plant approval process. These included 6 month, 4 month, and 21 day emergency approvals. While the 4 month and 21 day permits were granted for limited types of plants, the 6 month process was open to all power plant types. Tradeoffs were made in the effort to get power online as quickly as possible – tradeoffs that do not make such extreme expedited approval processes viable or desired options in California.

In both the 4 month and 21 day processes, the agencies responsible for making approvals were forced to do so without evaluating all the facts, thus risking the compromise of California's stringent environmental standards.[19] Additionally, public input was curtailed, which excluded local interests. The 21 day process, which required that plants be operational by September 2001, was so demanding on developers, that applications were actually withdrawn because developers could not build their plants fast enough.[20]

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[19] Susan F. Tierney and Paul J. Hibbard, "Siting Power Plants: Recent Experiences in California and Best Practices in Other States", *Hewlett Foundation Energy Series*, February, 2002, p. 23.

[20] Jack Lyne, "California Power Plant Built in Only 88 Days", *Site Selection*, November 5, 2001, <www.conway.com/ssinsider/snapshot/sf011105.htm>

While the 4 month and 21 day expedited processes were developed specifically to bring power online in the summer of 2001 – simple cycle thermal plants for the 4 month, and peaker plants for the 21 day – and had sunset provisions for the end of that year, the 6 month process was designed to address the lag in power plant construction over the last decade, and were set to continue through the end of 2003. In order for an application to be considered under the 6 month process, a developer must show up front that the project will not cause significant impacts on the environment, electrical system, or transmission lines, and is in compliance with all local, state, and federal laws. Because the developer is required to provide all of the information that is traditionally prepared in the 12 month process, the California State Auditor (CSA) concluded that the 6 month process itself may well act as a deterrent to developers, as the application requirements prove to be too cumbersome.[21]

Not only does the 6 month process have the opposite effect as was originally intended, but this approach does not address any reasons why so few power plants were constructed in the 1990s, nor does it touch upon any factors related to the traditional 12 month approval process. Making adjustments to increase the efficiency of the traditional permitting process can be achieved without compromising any of California's environmental standards, and without resorting to drastic cuts in the approval process. With a proper and efficient 12 month approval process, there will not be a need for tinkering with questionable expedited processes.

UNCERTAINTY

The lack of new power plants in California throughout the 1990s is well documented. During 1991 to 1995, investor-owned utilities submitted only one application to build a power plant. Between 1994 and 1997, the CEC did not receive a single application for a power plant. Though conventional wisdom dictates that this lack of new generating supply is a result of California's stringent environmental regulations, most studies conclude that uncertainty regarding energy restructuring was the primary cause of investor trepidation.[22] With investors unsure over what rules would dictate the energy market in

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[21] "California Energy Commission: Although External Factors Have Caused Delays in Its Approved Sites, Its Application Process is Reasonable", California State Auditor, Bureau of State Audits, Report 2001-118, August 2001, p. 36 <http://www.bsa.ca.gov/bsa/pdfs/2000-118.pdf>

[22] Ibid, p. 5; Susan F. Tierney and Paul J. Hibbard, "Siting Power Plants: Recent Experiences in California and Best Practices in Other States", *Hewlett Foundation Energy Series*, February, 2002, p. 2,5, 14; Richard E. Brown and Jonathan G. Koomey, "Electric Use in California: Past Trends and Present Usage Patterns", Energy Analysis Department, Environmental Energy Technologies Department, University of California – Berkeley National

California, there would naturally be a sharp reduction in the applications for new plants. Uncertainly with regards to the future of the market greatly increases investor risk. Additionally, throughout much of the 1990s, California had an excess supply of power, thus inhibiting the incentive to build new plants. Once AB 1890 was passed, an increase in power plant applications was observed. Some have concluded that the California review process at least played a role in deterring the investment of new generating facilities.[23] In a competitive electric market where investors can choose amongst any number of states, it is of the utmost importance to maximize the efficiency of the permitting process, without sacrificing any environmental goals or public concerns.

PERMITTING AND OPERATING DELAYS

It is estimated that power plants in California take three to five years from conception to operation;[24] which is considerably longer than most other Western states – where getting a plant online generally takes between one to three years. There have been a confluence of factors that have caused the permitting process to extend beyond the traditional 12 month deadline, and a number of issues delaying the construction and operation of plants following CEC approval. A 2001 CSA report found that between 1990 and 2001, the average CEC approval time for the 23 permitted applications was 14 months, plus an additional 2 ½ months in the pre-filing phase.[25] In that time, an additional 13 applications were withdrawn.

However, delays in the permitting process are not caused solely by the CEC. Applicants were often tardy in submitting necessary information, including studies of the impact of air and water quality. Applicants also contributed to delays by amending their applications in the middle of the approval process. Additionally, relevant federal, state, and local agencies, whose approval is necessary, did not always process their approvals on time.

Laboratory, May 2002, p. 21; Alan Nogee, "Where Has All the Power Gone? Power Company Decisions Play Key Role in California's Energy Crisis", *Nucleus – The Magazine of the Union of Concerned Scientists*, Volume 23, Number 1, Spring 2001, <http://www.ucsusa.org/publications/nucleus.cfm?publicationID=169>

[23] Eric Hirst, "The California Electricity Crisis: Lessons for Other States", *Edison Electric Institute*, July, 2001, p. 8.

[24] Adrian T. Moore and Lynne Kiesling, "Powering Up California: Policy Alternatives for the California Energy Crisis", Reason Public Policy Institute Policy Study #280 , February 2001, p. 16, <http://www.rppi.org/ps280central.html>; Lynn Scarlett, "California Must Streamline Regulation to Provide Power and Protect the Air", *Tech Central Station*, February 12, 2001, <http://www.techcentralstation.com/021201E.html>

[25] "California Energy Commission: Although External Factors Have Caused Delays in Its Approved Sites, Its Application Process is Reasonable", California State Auditor, Bureau of State Audits, Report 2001-118, August 2001, p. 2, <http://www.bsa.ca.gov/bsa/pdfs/2000-118.pdf>

The CSA also found that the 12-month permitting process in California is generally similar to that of comparable states, particularly considering California's stringent environmental laws (as mentioned above approval in California is required in twenty technical areas; in Texas, by contrast, only one area – air quality – requires approval).

An overriding threat for the responsible agencies is litigation from private citizens, advocacy groups, and organizations. The system allows for legal action from the public if environmental concerns are not addressed in a manner consistent with CEC guidelines. It is not uncommon for groups or organizations to purposely tie projects up in court to delay their approval. Opposition to power plants is often strongest from community organizations (often called NIMBY groups – "Not in My Backyard") and national environmental organizations such as the Sierra Club. Though not all of them have legal standing or reason to file noncompliance suites, they still succeed in at least delaying the project which can increase the cost to a point where it is not longer financially feasible for the developer to pursue the construction of a power generation facility.

The CEC permitting process allows for a substantial degree of public influence, which is often another cause of delay. In addition to public hearings and meetings throughout the process, any individual or group can become an 'intervener'. Intervener status allows anyone to petition the CEC to become a formal party in the permitting process, with the same rights as the applicant or CEC staff. Interveners are often environmental or other special interest groups. The CSA report points to an example of a union organization called California Unions for Reliable Energy having the power to delay a project until an applicant reached an agreement with union workers. Additionally, once an approval is given by the CEC, local organizations or any other group can hold up construction in litigation. When companies need to spend months, or even years catering to the interests of each and every party, not only is this a clear deterrent for investors, but one must certainly call into question whether the public interest is actually being served. A fine line exists between hearing and responding to legitimate public concerns, and appeasing special interests that are given, and certainly take advantage of, the opportunity to abuse the permitting process for personal gain.

THE REGULATORY AUTHORITATIVE BODY

The list of state and federal regulatory bodies that impact the California energy system is vast and varied. They represent a variety of interests and have been around for varying lengths of time. The connection

between them is often complicated. Their functions often overlap, are redundant and at times are undefined. (see Appendix B for detailed description)

SUMMARY: CALIFORNIA'S ENERGY MARKET TODAY

California's energy regulatory structure is complicated. It is a peculiar mixed form of regulation with regard to pricing and provider choice. Retail prices are regulated for large publicly owned utilities only and consumers can not choose their provider, and the wholesale market is regulated by FERC. FERC regulates transmission lines so that they are open to all providers; however, because the state no longer allows consumers a choice of provider, the lines are used mostly for the local retailer who controls each area.

California has not experienced an energy crisis since 2001 and there have been positive changes to both the administrative processes and the transmission grid that put the system in a better position. However, considering the growing supply-demand gap and the lack of incentive for new production there is still serious growing potential for another crisis in the future. The state absolutely must develop a new comprehensive energy policy in order to avert such a threat. To that end, this paper focuses primarily on supply side measures; however it does touch on demand side measures that are relevant in an environment of ever-increasing demand.

POLICY PRIORITIES

A successful energy policy is one that guarantees that California will be able to meet its future supply needs. Currently there is not enough energy being produced within the state to meet future demand. Therefore, California must incorporate ways to increase supply, whether power comes from within its own borders or it is imported from other states. In order to achieve this goal there are certain criteria that must be met to insure that California can increase its energy supply in a timely, economic, efficient and safe manner.

California must create an energy policy that guarantees reliability and stability of energy to its consumers. It must account for its current needs while factoring in growing population, increasing net use of electricity per household, and projected additional use of energy due to new technologies. The state must create an environment where it not only has the ability to supply its citizens with energy in anticipation of their needs as demand increases over time, but also in unanticipated conditions of extreme demand.

In its pursuit of reliability, California must be diverse in its sources of energy. The state must consider the detrimental aspects of dependence on a limited number of energy sources. (see Appendix C) Dependence on one or few sources of energy makes the state vulnerable to monopolistic pricing. As experienced in 2000-2001. California's primary dependence on natural gas held the electricity market hostage to exorbitant prices. There are numerous sources of alternative energy available with which to develop a greater diversified energy portfolio. (see Appendix D).

New system must be cost efficient. In devising ways to increase accessibility to, or more production of, energy supply, California must take into account the present state budget crisis. If capital outlays are paid by the state, it is the state's obligation to use taxpayer funds most efficiently and effectively. Costs should also be recovered based on usage – the fees charged to an entity should reflect the volume of services consumed. More simply put, those who receive the energy should pay for it. Should private industry finance the cost of new energy production, the state must be mindful not to overburden it with undue restrictions, allowing them to operate efficiently and to recoup costs. Similarly, energy prices should reflect the lowest cost possible.

While increasing its production of and access to more energy, the state must factor in various environmental concerns. California has a high concentration, relative to other states, of environmentally

aware and concerned citizens and advocacy groups. They have worked for over 30 years to create and ensure legislation to protect the environment. Since energy production often degrades the environment, this legislation must be examined in light of the state's increasing energy needs. The state must create policy that balances an acceptable level of environmental threat and increased energy supply.

Social obstacles must be addressed. It is important to take into account the social concerns that will arise with regard to the various methods to increase energy supply. There will be a variety of aspects ranging from private property rights, pricing mechanisms that will affect low income consumers, safety and aesthetic values, as well as class and race-based arguments over facility placement that will surface. Any plan must try its best to mitigate these concerns while balancing them with the necessary process of increasing supply.

STRATEGIES TO INCREASE CALIFORNIA'S ENERGY SUPPLY

Considering the enormity of the problem at hand there is no simple solution as to how to most effectively and efficiently increase the energy supply in California. Regardless of the strategy undertaken to increase California's energy supply, efforts must be made to make the environmental permitting process more efficient. A more efficient process will reduce cost to the state, in terms of regulatory expense and tie ups in the court system, as well as developers. So inherent in any strategy is an approach to add a greater level of efficiency to the permitting process, without sacrificing any of the state's stringent environmental regulations.

Following are four different approaches we considered as the best ways to meet this goal. We will examine each approach in the context of the priorities discussed above.

PUBLIC PRODUCTION MODEL

Using this approach, California would be responsible for purchasing and building all new power plants and upgrading the transmission system for those plants. In order to fulfill these responsibilities, California needs to form an entity to operate these plants. The state will legislate environmental exemptions for facilities and support new technologies making funding accessible for research and development and for "green" technology. The state will also be required to provide a reserve margin. This option is based on the belief that the private sector is profit-oriented and such public services as energy-providing are too important to be maintained by anyone but government.

The public production model is the most reliable among all the approaches to generate enough plants. The processes of siting, approving, financing, and constructing would be more fluent, compared to those of the private sector. Sufficient plants would get built; the state could precisely meet its diversified energy portfolio by creating wind plants, harnessing enough solar energy, and other renewable sources, and it could guarantee to meet its energy reserve without relying on compliance by the private sector. Without an incentive and final goal of maximizing profits, public ownership would be more likely to pursue environmental goals, which reflect the greater concerns of the public. Regulators can also maintain a level of review that guards against opportunistic behavior and volatility of market or the self-interest of corporations that have little regard for the best interest of California. In addition, costs may be lower. According to Christopher Weare from the California's Public Policy Institute, studies have provided some

support for a small cost advantage for public utilities, as public ownership avoids the informational costs associated with regulation.[26]

While it is considered to be the most reliable and environmentally friendly model, the state-owned and operated system fails to address a number of concerns. First, it suffers from distinct and well-known disadvantages of inefficiency. The internal incentives of government bureaus to increase their organizational prestige and influence, which are usually unchecked by competition, may run counter to the interests of the customers they serve. It can easily lead to corruption and lack of transparency. In addition, the creation of a fourteenth state entity dealing with energy will only further slow things down. Furthermore, this system cannot encourage the consumers to be "wise" or "intelligent" consumers when regulators fails to provide consumers with price signals that reflect the underlying costs of the electricity they consume.

Second, this option goes against the policy direction of the FERC as it works to establish regional electricity markets in the United States. Technical development may be also a factor to impede this system. Technological advances create ever-smaller plants that can generate electricity at competitive costs, facilitating entry by new firms and enabling large customers to self-generate. Efforts to bottle up these sources of power through public ownership or regulation become increasingly difficult and inefficient.

Third, public ownership choice will be inevitable to touch on the issue of private property rights. Persuading and providing proper remedies to land owners is an issue that would need to be addressed.

The main tradeoff posed by this option is between the greater reliability and stability versus the efficiency gains made possible by competition. However, after the electricity crisis and rolling blackouts of 2000-2001, advocates of the public production seemed to gaining support.

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26 Christopher Weare, *The California Electricity Crisis: Causes and Policy Options*, (San Francisco: Public Policy Institute of California, 2003), <http://www.ppic.org/content/pubs/R_103CWR.pdf>

FREE MARKET ELECTRICITY MODEL

This options calls for the removal of the state from the energy market. The government would have to maintain certain oversight duties, but energy production, transmission, and consumption would be left to a free market system. This system would allow for-profit energy companies to compete for the business of California's residents. Energy would be produced from privately owned plants. This system would encourage higher production by allowing firms to earn a profit for using resources to produce electricity for California. The state would not exhibit control over the private companies or supply and demand issues of the market, including price. The residents of California could expect a number of pros and cons associated with a free market electricity system.

With the introduction of a completely competitive energy market in California, the residents could expect their energy bills to directly reflect the price of energy production. There would be no price supports by the state. This factor could lead to a reduction in consumer energy costs within the state. Under a competitive system, economic theory dictates that firms will be forced to keep prices low to compete with one another. However, it must be understood that the residents of California are at the mercy of the market; prices would reflect the amount of supply and demand within the state, which could be high in times of shortage.

A free market would create a more efficient system. The for-profit energy providers would be forced to run efficiently to compete for the business of the consumers who are interested in having power provided at a competitive price. By cutting out governmental intervention and allowing the market to work, California's residents would experience something completely different than the status quo. Consumers would be allowed to choose their energy provider, a decision that will most often hinge on the price of the commodity. Free market economists hold that a market with competition and little governmental intervention will provide the most efficient system. Firms will have the same barriers to entry, e.g. the permitting process and plant production costs, in this system that rewards operational efficiency.

The consumers of California are expected to benefit from a competitive market. However, in this system there are no incentives to produce more environmentally friendly power. Consumers will demand power at the lowest price, with the exception of a few residents who would prefer to pay higher rates for 'green power.' So-called green power, in most instances, is more expensive to produce or at least less efficient than tradition methods. These factors associated with green power would preclude its ability to compete in a free market energy system, therefore casting a shadow on its future.

Another factor that would have to be considered in such a system is the support of low earning consumers. A competitive system would allow the market to set the price of electricity; this price could be unaffordable to some of California's residents. In a free market system there would no government funded or mandated support for low earning residents. The possibility of assistance would be left to the market players themselves and to what extent they would protect the poor is unknown. It is likely their support would not be to the level that most Californians desire.

Generally speaking there are many benefits to the privately owned, free market system and this option would rank high according to many of our policy priorities. Efficiency would be rewarded and consumers would gain from the competitive system. The positives of this system are the foundation of the attempt to deregulate the market in 1996. However, other policy priorities would not rank very high, i.e. environmental concerns. Low earning assistance would also have to be addressed to make this system viable for California's future. We hold that there is an inherent good in producing more environmentally friendly power. We also believe that the government has a responsibility to assist low earning consumers in obtaining the power that is necessary for the essentials of life. For these reasons, we do not advocate a total free market system without the advent of safeguards to mitigate for the system's downsides.

INSTATE PRODUCTION MODEL

The first goal of this model is to meet California's energy needs through instate production. Once the energy is produced, the second goal is to make sure that power stays within the state. This type of model can be achieved through tax incentives and legislative mandates.

Creating a hospitable atmosphere for energy producers will attract investment. There should be consideration for what can be done on the state level to initiate a climate for energy producers to enter the market, but the state must also be mindful of side factors that will undoubtedly affect the citizens of California. The state must strive to meet those concerns, while at the same time addressing the issue of adequate energy supply. The government must find a way to update the grid system, enact legislation to make sure that power produced instate remains instate, and it must devise a strategy to place power plants in desired regions.

In order to attract investment, the state must proactively address the grid issue. In certain parts of the state the current infrastructure may not be able to meet consumers' future electricity needs. The state could take the responsibility upon itself to purchase the lines and make necessary improvements through tax

revenue, or the state could offer tax incentives to companies coming into California that are willing to make the necessary infrastructure upgrades themselves. Another option would be for the state to stipulate by law that incoming power producers must upgrade the infrastructure at their own expense. Each option is more or less conducive to attracting investment than the next; nevertheless, an improved grid system would help to create an attractive climate for those interested in providing supply.

Once energy suppliers are willing to produce instate there is still the matter of where plants will be built. There are a variety of factors that need to be considered. Producers will want to build in areas that are the most cost effective; however, this does not always coincide with locations that are in the best interest of California. The state can require by law where plants can and cannot be built, and to some degree they already do, but this type of policy does little to create an atmosphere attractive to investors. This is a case where tax incentives could be used to attract energy suppliers to areas that may not normally be as financially lucrative. In this case, the state may lose some future tax revenue, but the alternative is no tax revenue whatsoever if producers decide to invest elsewhere. This would help address the issue of getting plants built in areas that are deficient in supply. It also allows the state to add to the job base by locating plants in areas where there is a demand for this type of employment.

Finally, there is the matter of keeping power in California once it has been produced. The state makes sacrifices by producing all of its electricity within its borders. After all, there are external costs associated with producing power in state, primarily pollution. Naturally this is a tradeoff for having an abundant reliable supply of energy. There are options to look at when addressing the retention of electricity that is being produced in California. Again, the state can look at mandates, stipulating that by law producers may only sell power within the state. This will produce a number of problems, notably it will be a detriment to attracting investors if they think they are limited to the quantity they can produce and the profit they can make. One must also acknowledge possible legal ramifications. Having such mandates would likely bring about violations of any number of interstate commerce laws and undoubtedly be overturned by the courts. Again, tax incentives are a possibility for the state to retain power without setting mandates. The state could look toward a subsidy system that allows the state to purchase power that reaches beyond a certain ceiling price, so that producers will not be economically damaged if they do not sell power across state lines. This would be very risky and ultimately California could run into the same problems it faced in 2001. Although, this would give energy suppliers a reason to invest and it would meet the criteria for having a stable supply.

Although these options would attract investment into California and maintain a reliable source of energy for years to come; they also require further state involvement by creating new regulatory and oversight committees, which ultimately adds to the existing bureaucracy. This is an elaborate mechanism that would take great time and effort on behalf of the state. There would invariably be problems with regard to all of these solutions and they still would not address the key issue in addressing supply and that is price.

MARKET RATE MODEL

As was intended by the state back in 1996, the goal of this model is to encourage true competition for the provision of energy service by further lifting regulations in the energy market. By allowing retail prices to fluctuate along with wholesale prices and by allowing consumers to choose their energy producer, incentives would be created for new producers to enter the market. Eventually California can achieve the benefits of a minimally regulated market currently enjoyed by states such as Pennsylvania and Texas, and countries such as Great Britain and Australia. These measures would create what would be considered a market-driven pricing system; the benefits being lower average prices, more reliable service, higher customer satisfaction and a greater use of alternative “green” energy sources.

While the aforementioned measures will create more of a free-market structure for energy, California must make changes at the regulatory level to shorten and simplify the processes for application and approval of new power plants, thus creating a more encouraging environment for new energy production. Part of those changes need to include the reorganization of the various agencies that regulate and oversee California’s energy systems.

California’s sensibilities require that a certain proportion of energy be derived from renewable sources. This serves the state in two ways. First, that power generation emits a limited amount of pollution. Second, this increases the degree of energy diversification, which limits the risk to the state of volatile energy prices. As in Pennsylvania, it is expected that the lessoning of regulations will allow market forces to draw “green” energy producers to California.

This model presents a long-term approach to California’s energy imbalance. While it does not accomplish an immediate remedy for increasing supply of energy, over the long term it will create a more stable and efficient supply structure.

Though much of the demand side of the imbalance is outside of its direct control, the state must continue to take available measures to curb demand. This includes long-term approaches such as real-time pricing mechanisms and various energy saving programs such as the “Green Bank” and “Energy Star” programs.

RECOMMENDATION

California's failure in the creation of a restructured energy market arguably did more harm to the cause of deregulation than any of the policy's actual successes in other states and countries have overcome. California's version of deregulation actually created more state intervention in electricity transactions than had existed previously in its "regulated" system. Exacerbating forces of extreme weather and volatile natural gas prices tipped the scale in what had become an unbalanced, micro-managed pseudo-market. These blackouts could have been avoided, despite the extremes in weather and natural gas prices, had the electricity market been deregulated in more than name only.

We recommend that California undertake the methods outlined in the Market Rate Model, creating a truly competitive electricity market. The cornerstone of this recommendation is the establishment of a process allowing retail prices to reflect the market rates, encouraging new suppliers to enter the market.

California is a state where the environment is highly prized by its citizens and, accordingly, any activity that might affect environmental conditions is highly regulated. When viewed from the perspective of the production of a good, California is not conducive to energy production. It fosters restrictive environmental regulations, and it burdens its businesses with heavy regulation, including protection of its citizens from high energy prices. While the state exports numerous superior goods, electricity is not often one of them. California's high priority on environmental protection and its paternalistic stance toward the "price gouging" of its citizens by utilities are in direct opposition to each other. Regardless of whether energy is produced in-state or imported from outside California, the cost is ultimately borne by the citizen via taxes and energy rates. So accepting the fact that the citizens must pay for energy, we must also accept that importing energy is as good a solution as any, with the added benefit of not creating environmental damage locally. Accepting these premises does not mean the state should only look to place new generation facilities outside its borders. Rather, with the proper combination of measures enacted to develop a market rate system, the right conditions will bring new generation in to California. The price Californians pay for their power will reflect the value they place on the state's environment, its business climate, and their personal convenience.

Our recommended measures to create more supply are:

- Gradually lift retail price caps, which will eventually create free-market responses wherein prices respond to demand and supply. This is a critical tenet to the Market-Priced Model. Dr. Adrian T. Moore, Executive Director of the Reason Public Policy Institute stated in an address to the U.S.

House of Representatives Subcommittee on Energy and Air Quality in February of 2001 that price caps hurt California in four ways: [27]

> First and foremost, price caps create a chasm between wholesale and retail prices. As was clearly demonstrated by this scheme in 2000, it was for this reason that some of the California utilities were forced to file for bankruptcy protection. The power they purchased for resale was obtained at a price much higher than the regulated and artificially low price at which they had to sell. As the supply of energy shrank and the demand remained steady, the gulf between wholesale and retail prices widened. Each kilowatt-hour of energy sold pushed the utilities further into debt. The caps need to be lifted to return parity between wholesale and retail energy prices.
>
> Second, price caps discourage new firms from entering California's market, thus limiting competition. Firms have little or no incentive to incur the capital outlays required to enter the market when they know that their returns (the price they are allowed to charge for services) are capped. The caps need to be lifted to remove this disincentive to entry.
>
> Third, price caps reduce incentives to invest in either new generation or new transmission facilities. Corporations put their capital where the return is greatest. The presence of price caps limit the return utility and generation companies expect to gain on their investments. If a firm has the option of investing in a power generation project in one of two states, but one of the two states is limiting the firm's return on the project, why would this firm choose to invest in that state? The caps need to be lifted to remove this investment disincentive.
>
> Fourth, price caps block signals about electricity shortages from the end users, thereby removing incentives to change their consumption behavior. Prices are a signaling device in the market. Price movements carry signals between the supplier and consumer about the scarcity and demand of a product. By capping prices the consumers have no incentive to limit their buying habits during shortages. Despite the shortage of energy, the quantity of energy supplied does not change because of the first and second reasons addressed above. The caps need to be lifted in order to allow the transmission of market signals.

- Ensure open entry to competing retail suppliers by giving them the right to bypass the local distribution supplier.
- Begin the process of instituting real-time pricing mechanisms.
- Ensure adequate programs to protect the poor when retail prices get particularly high.
- Increase efficiency and speed of the power plant application process.

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[27] Text of Dr. Moore's speech is available on the Reason Public Policy Institute website at <http://www.rppi.org/electricity/013001.html>

- Minimize and reorganize the California regulatory bodies that effect energy policy and activity to create simplicity and efficiency.

- Require utilities to get a certain percentage of their energy sources from renewable sources, by giving teeth to SB 1078 enacted in September 2002, which requires utilities use 20% renewable sources by 2017.

- Continue to encourage and create energy efficiency programs such as the Green Bank Program, Energy Star Programs.

Together these measures will best satisfy the criteria of creating a stable and reliable energy supply and slowly creating new energy source options for the future, while damage to the environment and cost to the state is minimized, both of which reflect California's citizens' sensibilities.

IMPLEMENTATION

There are a variety of measures to be taken in order to carry out our proposed measure to increase the energy supply in California. Below are the most important changes that need to take place in order to achieve our prescribed goal.

LIFT PRICE CAPS AND OPEN MARKETS TO CONSUMER CHOICE

The foundation of the market-rate system is the passage of coinciding legislation regarding the gradual and predictable lifting of price caps and the re-institution of "direct access" to consumers, which is the ability for consumers to make a contract with the electricity producer of their choice. Raising rates in this manner will entice new suppliers into the market, providing consumers with a wider range of competing provider options. Over time, an increase in market competition will lead eventually to increased service offerings and possibly lower prices.

The state should begin by tying rate-cap increases to accomplished benchmarks that have increased competition and customer choice in the market and have reduced utilities' market power. Clearly, the faster the success, the sooner price caps can be lifted. To create consistency and security in the minds of consumers it must be made clear from the onset that retail prices from all IOUs will only be raised to a specified level and will be held there for a specified period of time. We also recommend that prices are to be raised initially for large volume consumers only.

After the initial increase these caps will again be raised under clearly stated conditions and for a similar specified length of time. It is during this time that the market will become attractive to new investment, and additional power suppliers will enter the market.[28] The point at which IOUs no longer have a

[28] Texas provides an example of a specific methodology for raising energy price caps. Texas created a "Price-to-Beat" rate for affiliated retail electric providers (REPs) of its own IOUs. The Price-to-Beat rate was 6% lower than the prevailing rate. This system provided immediate discounts for those who chose to stay with their affiliated REPs. For those customers who chose to switch to a non-affiliated REP, there was potential for even greater discounts, benefits in the form of options for other products and services, including renewable energy sources, and better customer service. The plan also provided for changes in Price-To-Beat rates when a large portion of customers left the affiliated REPs or in response to changes in natural gas or other fuel costs. Municipal utilities and cooperatives were not required to reduce their rates. While this method couldn't directly apply to California because its IOUs do not own much generation, the Texas example shows that caps can be raised successfully and in a controlled environment.

monopoly and consumers have many choices, the market caps can be altogether lifted and they can benefit from the lower prices created by competition.

At the time of the first price cap increase, the regulations mandating that power consumers in a given region must purchase power from that region's sole power provider must be abolished, allowing full consumer choice in electrical services.[29] Under this recommendation all IOUs must be charging the same retail rates, which will be initially tied to wholesale prices. This protects the IOUs from the volatility in wholesale prices experienced in 2001. Should the scenario of extremely high wholesale prices reoccur after the market restructuring, all IOU's would make less profit but not go into debt, and all IOU ratepayers would pay more. Even those consumers who have chosen independent energy service providers would be paying more because wholesale rates would generally be higher. Should direct alternative sources like "renewables" be available, those who have chosen to pay more for such sources would likely be paying less.

However, some of the particular conditions that contributed to such high wholesale prices in 2001 no longer exist. Because IOUs will no longer be required to sell and purchase energy through the PX, and because they would now be allowed to make long term energy contracts, the, potential for price-manipulation under extreme demand would now be minimized.

As previously stated, legislation that would allow consumers to once again choose their own electricity provider must accompany the lifting of price caps. Recently, California Assembly Speaker Fabian Nunez spoke of proposing a bill that would allow consumer choice, but that continued the state's calculation of retail prices based on cost. We recommend that Speaker Nunez propose the policy of gradually lifting price caps based on wholesale prices and giving consumers the choice of energy providers as we've explained above in an effort to develop a market-driven price structure.

REAL TIME PRICING

A market-priced energy system is one that provides consumers control over how much they spend on energy. This is accomplished not only by being able to choose from whom energy will be purchased, but

[29] The combined of effect of consumer choice and price caps had a devastating affect on the utilities, and in response in September 2001, the state halted "direct access" to stop customers from leaving the IOUs for competitors offering lower prices.

also when that energy will be purchased. The "when" is accomplished through consumer access to when energy is being used throughout the day and comparing these times of consumption with the flexible energy prices at those times. Real-time pricing is an essential long-term solution to balancing the hourly supply and demand for power in California. Implementing real-time pricing and metering can also justify accelerating the schedule for removing price caps.

There are two basic components to real-time pricing: 1) a meter that records a customer's hourly electricity consumption; and 2) a pricing system based on multiplying each hour's consumption by an amount based on the wholesale cost of electricity during that hour. During peak hours of usage, utilities will be allowed to charge more and consequently they will charge less when demand is lower. Consumers will be able to obtain financial benefit by shifting consumption from hours with high wholesale prices to those hours with lower wholesale prices.

Real-time pricing will allow an energy market to develop that functions according to true supply and demand pressures. Real-time pricing will send an economic signal about the value of conservation and allows the consumer to then determine what course of action to take.

IMPLEMENTING REAL TIME PRICING FOR ALL CONSUMERS

In order to implement real-time pricing for all consumers, approximately 10 million meters would have to be installed; installation of meters range from $200 and $1,000 per meter, depending on the technology used. This poses a drawback for smaller users due to expensive. Therefore, the installation of real-time meters to residential homes would be a long-term goal.

With regard to major industrial and commercial users, only 18,000 new meters need to be installed according to the California Senate Office of Research. Although former governor Gray Davis launched a project on June 7, 2001 to install real-time electricity meters in Los Angeles, the PUC has not approved a real-time pricing scheme, which is an essential step in carrying out the program.[30] Currently the Peak Load Reduction Program is available to commercial and industrial customers with peak demands greater than 200 kilowatts. The SDG&E program is available to those with peak demands greater than 300

[30] Nick Vucinich, "Exploring the Arguments for Real-time Pricing", *California Senate Office of Research Homepage*, August 2001, <http://www.sen.ca.gov/sor/policy/energy/Realtimememo1.htm>

kilowatts. Customers can view their hourly use profiles on the Internet and on websites maintained by the local utilities.

Governor Arnold Schwarzenegger supports real-time pricing for businesses to promote energy conservation. According to the California Senate Office of Research, "almost all empirical evidence shows that commercial and industrial customers would respond to energy prices based on hourly use."[31] Once real-time pricing reaches all large industries it will be time to devise a plan to install them for residential users in order to promote conservation and reduce demand during peak hours, which in effect will prevent future blackouts in California.

ENERGY ASSISTANCE FOR LOW INCOME HOUSEHOLDS

Our recommendation carries a risk that energy prices for consumers will increase. Unfortunately, it will have a negative impact on certain households. However, this is a necessary, but temporary, step in order to increase supply. Therefore it is important to educate California residents on the many federal and state programs already designed to assist those with lower incomes to insure they have access to power. Due to the numerous entities in place, there is no need at this time to develop new energy assistant programs. (see Appendix E)

REORGANIZATION OF REGULATORY BODIES

The combination of energy-related regulatory bodies is complex. The overlap of authority in such agencies and varying agendas has led to duplication, confusion, and conflict in policymaking. It has also led to coordination problems and policy failures or delays. California must assess each agency's authority and re-examine the complex set of administrative connections between them with regard to energy involvement. It must then minimize, simplify, and reorganize them in order to develop a coordinated, comprehensive, and effective set of policies.

First, an umbrella organization is needed to coordinate the current responsibilities or functions of different agencies. If a new organization will cause more bureaucracy over the current system, at least a

[31] Ibid.

memorandum of understanding among all the regulatory agencies should be established to ensure a timely, sufficient, and continued coordination of the different agencies' activities.

Second, we suggest eliminating the California Power Authority (CPA) as the 2004-05 budget proposed, but transfer some of its authorities to other existing agencies. Considering that factors beyond the CPA's control have rendered it unable to serve in much of its intended capacity, it would be wise to transfer its specific authorities; the ability to exercise financing power in the event that the market does not produce enough electricity to serve the State's needs and energy efficiency and conservation programs to other agencies. (see Appendix B)

IMPLEMENTING AN EFFICIENT POWER PLANT APPROVAL PROCESS

There are a number of factors that lead to delays in the permitting of power plants; however, changes can be made to increase efficiency without affecting or compromising the state's strict environmental regulations. By increasing the efficiency of the current system, the state can eliminate the need for emergency expedited approvals that risk rushing through environmental permitting, largely excluding the public from the process, and put excessive demands on developers.

PREFILING

Implementing a change in the meaning and function of the prefiling phase of permitting is of critical importance in increasing the efficiency of the process. As mentioned above, the current prefiling phase is optional, with a voluntary preliminary review. It essentially exists so that the applicant can learn more about the process and find out about the potential issues that may arise later in the process. However, expanding this process can work to alleviate many of the issues that would otherwise later cause delays. Rather than leaving the extent to which the developer engages in prefiling as voluntary, the CEC should require a number of results from this preliminary phase.

The primary purpose of this phase should be increasing public awareness. It often takes months for the affected public to understand the details of a power project, and only then will these parties voice their opinion and take action they deem necessary to hold up the project. Usually, this occurs later into the permitting process. At that point, not only are some parties filing judicial appeals or taking other recourses to delay permitting, but they are doing so coming from a distrustful mindset. Opening up to the public from the very early stages can help solve this problem. The applicant should be required to

develop a presence in the community in this phase.[32] This could be done through public meetings and presentations, a toll-free hotline, community-wide mailings, and/or an updated website. The approach to a developer's community presence will likely differ depending on a given area. Particular attention needs to be paid to minority areas where English is not spoken as the primary language. The Public Advisor – a Governor appointed attorney who is responsible for ensuring that the public or any interested party understands and has the opportunity to participate in the CEC permitting process – should work with the developer in educating the public during this stage.

In addition to establishing a presence in the community and educating the public regarding the details, the developer should hold public hearings during the prefiling phase in order to bring out all issues of concern. If the public is part of the process from the preliminary stages, then there will be a greater opportunity to build public trust. The CEC can take this a step further, and consider adopting a prefiling scheme similar to that of Connecticut and Oregon, where a public hearing is held in the preliminary phase where parties are required to raise their concerns. Once the developer adequately addresses these concerns, outside parties can no longer raise additional issues, except by filing an appeal or being granted an exception.[33] Such a system will effectively eliminate the potential abuse of the public process that the CEC currently faces. Power plants certainly affect the overall landscape of a community, and as such environmental groups and the local population should be listened to. However, the intervener system as it currently stands is ripe for abuse by no-growth lobbies and special interests looking to advance personal agendas. Greater restrictions on qualifying as an intervener are essential to reducing permitting delays. All relevant and appropriate parties will still have the opportunity to become interveners, but care must be taken to screen out those with personal agendas that are not in the public interest. The CEC also needs to take a proactive approach in educating the developer in this stage, in order to ensure complete applications and timely reporting of data throughout the approval process.

It is of the utmost importance that baseless litigation, which has become commonplace under the current CEQA permitting rules, be addressed. Perhaps as great a disincentive as any to potential developers is the risk of getting tied up in costly and time consuming litigation with individuals and organizations intent on abusing the public process. As mentioned above, this could be mitigated by adopting a process similar to

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[32] In New York, for instance, applicants are required to demonstrate that they've carried out a substantial program of public involvement before their application is accepted.

[33] The Connecticut and Oregon permitting methods are described in the California State Auditor Report 2001-118, p. 23.

that of Connecticut or Oregon. Doing so would require a reform or exemption from CEQA guidelines that allow such suits to take place. Since the CEC permitting process has already been deemed as the rough equivalent to CEQA, and therefore need not follow CEQA guidelines strictly, such a possibility certainly exists – particularly if all interested parties are given the opportunity to voice their concerns from the early stages of the project, and the developer is allowed to make any necessary adjustments in the prefiling phase.

COORDINATION, TRANSPARENCY, DEADLINES

Improving the coordination between the CEC and other agencies involved in permitting can also cut down on delays. Though interagency coordination is already achieved to a limited extent in California, it can be improved, since it is not uncommon for agencies to be late in their required approvals. Not only will this improve the entire permitting process, but multiple agencies acting as a single unit provides fewer outlets to turn for an opposition responsible for delays.

The importance of a predictable and transparent approval process cannot be underestimated. By establishing a consistent precedent early in the permitting process on a case-by-case basis, and the entire process in general, developers will be able to anticipate CEC action and proactively adjust/improve as necessary. Consistency, even in examining all twenty technical areas as required by the CEC, will also make investing in California power and generating capacity more attractive, as the level of investor uncertainty is minimized.

The CEC can also implement a high level of consistency by enforcing its own deadlines. By following the prefiling phase above developers will be fully educated and informed regarding what is required of them throughout the entire permitting process. Failure on the part of the developer to adhere to established deadlines can and should result in termination of the application. Doing so would provide ample incentive for applicants to comply in a prompt manner. Another advantage to adhering to a strict deadline is that it allows less opportunity for other parties to raise issues later in the permitting process.

PROACTIVE ENVIRONMENT

One of the most important features in implementing an efficient permitting process is a proactive, unifying mindset. State regulators have a job to do, but their interests need not be diametrically opposed

to those of power plant applicants. Creating a team environment, where regulators work with developers from the early stages to proactively ensure compliance before any environmental or regulatory laws are violated, will reduce later delays and make California a more attractive place to invest. In order for this to happen, regulators must understand that it is the market and not the personal view of the regulator that determines the level of investment, and when and how many plants need to be built to generate sufficient capacity for Californians. By separating personal views from the situation at hand, the CEC and all appropriate agencies can achieve a sense of enlightened regulation, where they work with developers to get through the permitting, construction, and operating processes thoroughly and efficiently.

In an industry with a relatively open market, the CEC – through the permitting process – must resolve the inherent tension between allowing new generation and capacity to respond to price and maintaining effective and strict environmental regulation. Both of these factors are in the public interest. In an open industry, it is the market that determines need, and it is the preferences of the California resident that determines the direction of the market. Therefore it is consumer interest that dictates the need for power plants. However, one must take great care not to underestimate the effect a plant has on altering the look and feel of a community, let alone its environmental impact. It is the permitting process that should connect these two needs. By finding a common ground between public choice and public interest, one can see that the need for developers is a mere extension of public choice, and the desire to protect the environment is simply an extension of the public interest. An effective and efficient permitting process can achieve such a common ground. It is at this point that the CEC can truly fulfill their mission of advocating for energy in order to promote both the California economy and protect the environment.

RENEWABLE ENERGY CREDITS

California has made a firm commitment to renewable energy. With the passage of SB1078, the state has committed itself to implementing a system that supports the production and consumption of renewable energy. In order to accomplish this, California must continue to make progress on its initiative to formalize a system for tradable renewable energy credits (RECs).

A renewable energy trading program is one that allows for the trading, tracking, and submitting of credits in order to fulfill renewable requirements. According to Texas standards, an REC is the equivalent to one megawatt hour of renewable energy. Renewable energy exclusively relies on sources that are naturally regenerated over a short time and derived directly or indirectly from the sun, or from moving water or other natural movements and mechanisms of the environment. Such technologies include those that rely

on wind, geothermal, hydroelectric, wave, or tidal energy, or on biomass or biomass-based waste products, including landfill gas.[34] (see Appendix D for more information on the pros and cons of these sources)

The CEC is currently working in coordination with the Western Governors Association to develop a Western-wide Renewable Tracking System. The CEC was charged with the mission of creating a tracking system for California's Renewable Portfolio Standard (RPS). Western States are now working together to form the Western Renewable Energy Generation Information System (WREGIS). The CEC and WGA are currently putting on workshops so that this system can soon be implemented.

Once there is a Western-wide Renewable Tracking System, California will be able to take advantage of its ability and desire to produce, buy, and sell clean energy as Texas has done.[35] By helping to create a system for tradable renewable credits, the state will not only be aiding its goal of producing and consuming renewable energy, but it will also have the ability to become a net provider for other states within the system.

DIVERSIFIED ENERGY PORTFOLIO

It is in the interest of California to have reliable and stable energy for its citizens. The reinstitution of competition at market rates into California's utility industry satisfies these interests. The threat of losing market share to competition motivates the energy utility to maintain its owned generation facilities or to create and maintain profitable business relationships with third-party energy producers. The threat of competition ensures that a utility will have adequate energy reserves – or access to adequate energy reserves – to meet peak demand loads.

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[34] "Evolution Markets: Renewable Energy Credits Glossary of Terms", *Evolution Markets LLC Homepage*, Retrieved February 26, 2004, <http://www.evomarkets.com/mk_em_rec_gloss.html>

[35] Texas has already created a system for tradable renewable energy credits. Although it was the sixth state in the United States to require its utility companies to purchase renewable energy, it was one of the first to begin creating and implementing rules for tracking and trading renewable credits. In Texas, the responsibility for purchasing renewable credits belongs to the electricity retailers who are required to purchase credits based on their proportionate share of state-wide energy sales. The demand for renewable energy producers is on the rise due to the need for renewable energy and the development of a renewable energy credit trading system. More than 60% of new renewable energy capacity in the United States has been built in Texas.

The risk of price spikes in one particular fuel ensures that utilities will maintain diversified portfolios of energy generation. It is understood that for a firm to succeed in a field, it must be an expert in that field. For that reason, these portfolios will not, with few exceptions, be dictated by the State of California, but will be determined through private risk assessments in the energy market. The exception is in renewable generation, where California requires 20% of generation to be from "green" sources.

GREEN BUILDING BANK PROGRAM

Proposed and directed by Governor Schwarzenegger, the Green Building Bank can be used as one of the market-based incentives for energy saving. This program encourages individuals and especially businesses to retrofit commercial buildings with energy-saving lighting and other technologies, reducing the need for new power plants, saving money for businesses and taxpayers alike, and preserving air quality. A host of case studies demonstrated that it will be repaid in approximately 5 years based on electricity savings.

The objective of funding under this program will be the commercial and multi-family structure retrofitting for energy-efficient lighting and appliances, and heating and cooling. The Green Building Bank tries to explore a variety of funding sources such as private investment, commercial and institutional lending and existing revenue bonds. (For example, there are $170 million in unallocated California Alternative Energy and Advanced Technology Financing Authority (CAEFTA) revenue bonds available to finance alternative and renewable energy projects.) [36] The Green Building Bank will also help finance the addition of solar PV on large flat rooftops, repaid over time by the value of the new energy generated.

Schwarzenegger has asked Dan Emmett, one of his environmental advisors and a leading developer of office buildings in California, to head the private investment task force. Mr. Emmett converted millions of square feet of office space to make it energy efficient and paid back the cost in just 18 months with the money saved in energy fees.[37] The task force will be required to develop a model loan package for leading private lenders and help secure private financing for energy efficient retrofitting.

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[36] Governor Arnold Schwarzenegger, 2004 State of the State Address, January 6, 2004, Text of speech available at <http://www.governor.ca.gov/state/govsite/gov_homepage.jsp>

[37] Ibid.

ADDRESSING "DEREGULATION"

Any mention of the restructuring of the California electricity market will likely draw much negative attention, particularly one that has a market-based approach. Though our recommended plan is far from that of complete deregulation, it will no doubt be misnamed as such, just as it was in 1996. Many Californians associate the crisis resulting from the 1996 restructuring as a failure of "deregulation" and are rightfully timid with regard to any such concept. What they experienced under the guise of "deregulation" was a poor attempt to move toward market-driven pricing that, ultimately, was more burdensome than the previous regulated system. In proposing a market-priced system, it is important to address the difference between what was done in 1996 and why the associated failures will be avoided with the new system.

Although there was significant concern during the crisis over price gouging, the problem of blackouts was in large part a simple function of supply and demand. It must be noted that in the early 1990s, the state did have enough reserve capacity to meet an energy crisis; however, this was not the case after the state's restructuring. As explained previously in the history section, there were a variety of issues associated with the restructuring that contributed to the lack of reserves; and the subsequent inability of the state to purchase the needed supply to meet demand. Since 2001, factors contributing to a potential crisis have not arisen. However, should conditions arise once again where demand exceeds supply to such an extreme, our recommendations should create an environment where the state will be able to get the supply it needs, without causing the same damaging consequences.

Extreme price gouging will be avoided under our plan for three reasons:

1. FERC caps wholesale prices

2. Price gouging occurs only when there is high demand and little supply. This will be averted because by lifting retail price caps, consumers are able to respond to higher prices and will reduce consumption, which will decrease or hold demand stable. Also, by lifting prices caps and allowing direct access to consumers, production will increase, thus increasing supply.

3. See next section

A major contributor to the crisis in 2001 centered on how energy was purchased and sold. First, the state required utility companies to sell the energy they generated and then purchase wholesale power through the PX "spot" market. They were also prohibited from buying power by way of short, medium, and long term bilateral contracts. This made the contracts extremely vulnerable to manipulation that resulted in

gouging. Currently IOUs are not longer required to trade through the PX and are able to use various methods of bilateral contracting. This feature alone as part of our recommendation will help to ensure what happened before won't happen again, in two respects: 1) the utilities will be able to get the supply they need; and 2) by using various methods of contracting to hedge against high future prices, and will thus make them less subject to manipulation which resulted in gouging.

The second major contributing factor to the crisis was the disconnect between retail and wholesale prices. Wholesale prices were mostly deregulated but retail prices were fixed. This put two of the IOUs in a terrible squeeze, as they were not able to recoup the costs they had paid for energy on the wholesale side. SDG&E's prices were not fixed and so in the summer of 2000 they more than doubled. The response was that demand fell by an average of 1.6 percent, and by 6 percent during peak periods.[38] It is believed that people would have cut electricity use even more if they had not anticipated that rate controls would be reinstated.[39] With our recommendation, retail prices will be allowed to fluctuate thereby creating a supply/demand response as shown in the San Diego case. In other words the public will respond to fluctuating prices by adjusting how much they consume, in some cases, decreasing demand to which supply responds by lowering prices. This mechanism creates an indirect user-end power over prices and in turn gives consumers a sense of control and stability. In sum, while prices to consumers may rise initially under our recommendation, they will have more control over them collectively and individually.

Also under our plan, consumers will have more power over how much they spend on electricity in so far as they will be subject to real-time pricing.

In 2001, the energy crisis was further exacerbated by drought, affecting water levels in the west and California's ability to produce and purchase hydro-power. External factors such as extraordinarily high temperatures and low water levels must be addressed to the public. With our recommendation to create a diversified energy portfolio over time, dependence on a limited number of energy sources will not contribute to a future crisis.

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[38] James Bushnell and Erin Mansur, "The impact of Retail Rate Deregulation on Electricity Consumption in San Diego," POWER Working Paper 082, April 2001 at www.ucei.berkeley.ucei/PDF/pwp082.pdf

[39] Lynne Kiesling and Adrian T. Moore, "Movin' Juice: Making Electricity Transmission More Competitive," Reason Public Policy Institute Policy Study #314, September 2003, p. 6, < http://www.rppi.org/ps314.pdf>

Once again, California's negative experience with "deregulation," does not reflect whether or not a less regulated system can work. The failures of the 1996 restructure were not those of a deregulated or even semi-regulated market-rate system. The failures were due to the manner in which restructuring was implemented and to a certain degree uncontrollable forces that at the time could not be countered. They were primarily due to retail price caps, the PX structure for energy transactions, the poor response by government to the problems, and a combination of uncontrollable factors such as weather and natural gas prices. Our recommendation addresses all of those aspects that are within the state's control. Additionally, includes ways to hedge against uncontrollable factors, such as high gas prices. The State Legislators must be forthright both with themselves and their constituents about the causes of the 2000-2001 "deregulation" debacle and address those issues as stated to "fix" what they did wrong.

CONCLUSION

The energy crisis in 2001 devastated California both economically and emotionally. Financial losses to the state were estimated in the tens of billions of dollars and California is still suffering from its effects. These losses do not even take into account the immeasurable effects of fear and frustration experienced by citizens and business owners throughout the ordeal.

The 1996 attempt at deregulation, along with a host of other factors, contributed to the state's failure to insure that California's electricity demands were met. This disaster could be repeated if the state does not address its deficiency in supply. As it stands, the state is not doing enough to prevent this dilemma. All projections indicate that demand is outpacing supply and will continue to do so for years to come.

The need for a reliable and abundant energy supply in California can be met. There is no single solution to this dilemma, but through the coordinated combination of initiatives set forth in this paper, the state can proactively address the supply issue by ameliorating problems from the past, as well as by proposing alternatives for the future. In order to attract supply, the state must allow retail prices to reflect the true market demand for energy. California must also implement a strategy to cut down the bureaucracy associated with energy regulation; this would include streamlining the permitting process so that energy producers can more conveniently and effectively build facilities within the state. This cannot be done without taking into account Californians' commitment to social and environmental issues. That is why it is important to institute changes that include the use of renewable energy sources, as well as provide outlets and protections for its citizens to address such issues.

The course of action prescribed in this paper will afford California the ability to meet demand and remove the threat of a future energy crisis. It provides feasible solutions to a dire problem. It takes into consideration California's history, but focuses on solutions for the future, while never forgetting the unique social and political climate in which this plan must be implemented.

APPENDIX A. CEC APPLICATION PROCESS FOR PERMITTING POWER PLANTS[40]

- Prefiling – Before a formal application is filed, an applicant has the option to meet with CEC staff and relevant agencies to discuss issues related to the proposal. An optional preliminary review is also possible.

- Filing – Occurs when the applicant submits 125 copies of the application to the CEC for distribution to staff, relevant agencies, and interveners.

- Data Adequacy Stage – The CEC staff reviews an application to determine if it contains the elements necessary for thorough evaluation. The process can take up to 45 days. If the application is complete it is accepted by the CEC and moves to the next step.

- Discovery – This period in the first 45 days allows staff from local, state and federal agencies to gather information and identify the pertinent issues for the project. During this phase, informational hearings for the public are held.

- Analysis – This period is slated for days 45 to 220. It allows the staff to analyze the project and submit an assessment.

- Public Hearings – Hearings can occur anytime between day 90 and day 305. Energy Commission Committees, made up of two Energy Commissioners, govern these sessions. This allows for the findings of agencies, the applicant, staff, and interveners to be heard. During this time, public comment is also accepted.

- Decision – A decision on whether to approve or deny the application is slated to occur between day 305 and day 365; the full energy commission makes this decision.

[40] "Energy Facility Licensing Process: Developers Guide of Practices and Procedures", California Energy Commission Staff Report/Draft, November 2000, p. 6-8; California State Auditor Report 2001-118, p. 8.

APPENDIX B. ENERGY RELATED AGENCIES

The Federal Energy Regulatory Commission (FERC)

The FERC is an independent agency within the United States Department of Energy that regulates the interstate transmission of wholesale electricity, natural gas and oil. Its responsibilities include: regulating the transmission and sale of natural gas for resale in interstate commerce; regulating the transmission of oil by pipeline in interstate commerce; regulating the transmission and wholesale sales of electricity in interstate commerce; licensing and inspecting private, municipal, and state hydroelectric projects; approving the siting of and abandonment of interstate natural gas facilities, including pipelines, storage and liquefied natural gas; overseeing environmental matters related to natural gas and hydroelectricity projects and major electricity policy initiatives; and administering accounting and financial reporting regulations and conduct of regulated companies.[41]

As a direct result of the state's deregulation in 1996, the state's involvement with FERC has increased significantly over the last several years. Deregulation, therefore, resulted in greater federal oversight of the state's electricity industry.

Department of Justice (DOJ)

Under the direction of the Attorney General, the DOJ enforces state laws and provides legal services to state and local agencies. The DOJ has broad authority to represent the state before FERC to the extent it is deemed necessary to safeguard the public interest and protect ratepayers interests, including protecting ratepayers against unjustified increases in utility prices.[42]

California Energy Commission (CEC)

CEC is the state's primary energy policy and planning agency, and consists of a five commissioner, governor appointed board. It was created in 1974 by the Warren Alquist Act. It is responsible for the permitting and compliance issues related to the construction and operation of power plants in California, including environmental and land use issues. Specifically, CEC is responsible for forecasting energy supply and demand, developing and implementing energy conservation measures, conducting energy-related research and development programs, and siting major power plants. CEC is responsible for permitting all power plants 50MW or larger, and the plants related facilities such as transmission lines,

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[41] "About FERC: What FERC Does", *Federal Energy Regulatory Commission Homepage,* Page last updated September 29, 2003, <http://www.ferc.gov/about/ferc-does.asp>

[42] "Legislative Analyst's Office Analysis of the 2003-04 Budget Bill: Coordinating State Agency Representation Before the Federal Energy Regulatory Commission", *California Legislative Analyst's Office Homepage,* Retrieved March 4, 2004,
<http://www.lao.ca.gov/analysis%5F2003/resources/res%5F9%5Fcc%5Fferc%5Frepresentation%5Fanl03.htm>

fuel supply lines, water pipelines, etc. (Plants smaller than 50MW are permitted by county and city agencies.) CEC has not been directly involved in FERC proceedings for several years.

From 1998 to 2003, the Commission has processed 53 projects while only approving 47 projects over the previous 20 years. The following table also shows that, on average, the size of the more recent projects are about three times as large as projects prior to restructuring.

Project Summary - Pre & Post-Restructuring
January 28, 2004

PROJECTS	Projects	Megawatts
Pre-Restructuring Projects Approved (1978-1998)	47	5,589
Post-Restructuring Projects (1998-2003)		
Projects Approved and On-line	24	8,311
Projects Approved and Under Construction	7	2,644
Projects Approved and On Hold/Cancelled	13	7,444
Projects Currently in Review	9	4,212
Total Post-Restructuring	**53**	**22,611**

Source: California Energy Commission, http://www.energy.ca.gov/sitingcases/index.html.

Electricity Oversight Board (EOB)

The Electricity Oversight Board (EOB) was created by AB 1890. The board was originally created to oversee the California Independent System Operator (ISO) and the Power Exchange (PX), and was charged with securing the reliability of the state's energy supply.

The California Electricity Oversight Board (CEOB) provides regulatory oversight of California's restructured electricity industry. Its roles include: (1) ensuring reasonable wholesale prices in the daily markets and, when necessary, filing complaints on behalf of ratepayers (2) ensuring fair market rules, and (3) providing oversight to the California Independent System Operator (CAISO).[43]

The EOB's original role was modified after the 2001 energy crisis, which led to the bankruptcy of the PX. Its new roles include: (1) petitioning FERC on specific transmission matters in conjunction with CPUC; (2) communicating ISO's rule changes to FERC; (3) authorization to investigate the wholesale electricity market.

Currently, the EOB covers areas such as market monitoring, litigation, grid reliability, and generation outage and maintenance. [44]

California Public Utilities Commission (CPUC).

The CPUC is an agency headed by five governor-appointed Commissioners, and is charged with regulating privately held telecommunications, natural gas, water, railroad, and passenger transit companies. It is also responsible for protecting the interests of utility customers, as well as prosecuting unlawful and anti-competitive behavior in the utility industry.[45]

The Department of Water Resources (DWR)

Under the Assembly Bill 1 of the 2001-02 First Extraordinary Session (AB 1X), the California Energy Resources Scheduling (CERS) division at DWR was established as the sole buyer of power on behalf of the state's three largest IOUs during the energy crisis. Its authority to purchase electricity expired at the end of 2002, when the legislature and CPUC took actions to implement the return of power-procurement responsibility to the IOUs from the department. However, the DWR remains legally and financially responsible for the billions of dollars in long-term electricity contracts entered into during the crisis. The

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[43] *The California Electricity Oversight Board Homepage*, Retrieved March 4, 2004, <http://www.eob.ca.gov>

[44] "Legislative Analyst's Office Analysis of the 2002-03 Budget Bill: Electricity Oversight Board", *California Legislative Analyst's Office Homepage*, Retrieved March 4, 2004, <http://www.lao.ca.gov/analysis%5F2002/general%5Fgovt/gen%5F22%5F8870%5Fanl02.htm>

[45] "About CPUC" *California Public Utilities Commission Homepage*, Page last updated March 26, 2004, <http://www.cpuc.ca.gov/static/aboutcpuc/index.htm, the website of the CPUC>

DWR has been involved in representing the state before FERC on issues that directly affect its role as a major electricity buyer.

Settling the payments for the expensive long-term contracts has led to a prolonged dispute between the CPUC and the DWR over ratemaking authority. According to Christopher Weare at the Public Policy Institute of California, a bond issue to repay the general fund for power purchases was repeatedly delayed because of these disputes. Continued battles attempting to shift these costs to different groups of ratepayers and taxpayers can be expected in the future.[46]

The California Consumer Power and Conservation Financing Authority (California Power Authority, or CPA)

The CPA was created to secure a reliable power supply and energy reserve for California residents. To finance their mandate, the CPA can issue up to $5 billion in revenue bonds.

The CPA's primary functions include: (1) purchasing, leasing, or building new power plants using via revenue bonds ensure adequate power supplies; (2) promote renewable energy and energy conservation; and (3) aid the finance of retrofitting old and inefficient power plants.

In his 2004-05 budget proposals, Governor Arnold Schwarzenegger proposed dismantling the CPA, as well as its bonding authority and all of its current works in progress. The reasons cited include a failure to finance any new power plants, failure to achieve financial self-sufficiency, and duplication of many of the CPA's functions by other state and private entities. [47]

California Independent System Operator Corporation (CAISO)

CAISO was created under AB 1890 as a non-profit public benefit corporation, managing the statewide energy transmission system. It is responsible for reliable transmission of wholesale power to the IOUs by (1) planning and operating a safe and reliable electric system; (2) providing open and non-discriminatory electric transmission services; and (3) facilitating appropriate investment in electric transmission and generation infrastructure. [48]

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46 Christopher Weare, *The California Electricity Crisis: Causes and Policy Options*, (San Francisco: Public Policy Institute of California, 2003), p. 123. <http://www.ppic.org/content/pubs/R_103CWR.pdf>

47 "Legislative Analyst's Office Analysis of the 2004-05 Budget Bill: California Consumer Power and Conservation Financing Authority", February 2004, *California Legislative Analyst's Office Homepage*, Retrieved March 6, 2004, <http://www.lao.ca.gov/analysis%5F2004/resources/res%5F15%5F8665%5Fanl04.htm>

48 "The Mission of the California ISO", *California ISO Homepage*, Retrieved March 6, 2004, <http://www.caiso.com/aboutus/mission.html>

The Low Income Oversight Board (LIOB)

The Low Income Oversight Board (LIOB) advises the CPUC on low income assistance programs under the CPUC. The LIOB also acts as a liaison for the CPUC to low-income customers.

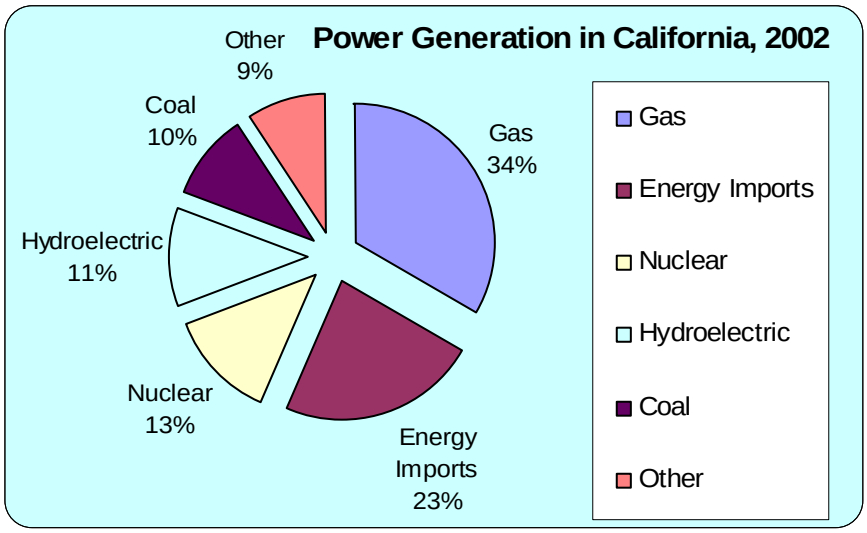
The table below shows the overlap in responsibilities among several different agencies. As can be seen in the table, four different agencies all forecast energy demand and supply, and six agencies share responsibility for planning electricity transmission infrastructure. Although some informal coordination mechanisms do exist among the agencies to help minimize the duplication of efforts, coordination between numerous agencies and the public is an extremely time-consuming process. Efforts to streamline the process have been well intended, but have had only minimal degrees of success. The overlaps have led to coordination and policy failures or delays.

Selected Activities and Responsibilities of Energy-Related Agencies

FUNCTION	CPUC	CEC	CPA	DWR	ISO	EOB	FERC
Rate regulating	X						X
Promoting energy conservation and efficiency	X	X	X				
Forecasting electricity demand	X	X		X	X		
Promoting renewable resources		X	X	X			
Licensing generators		X					
Conducting integrated resource planning	X	X	X				
Monitoring the electricity market	X					X	X
Monitoring/planning system reliability	X				X	X	
Planning electricity transmission infrastructure	X	X	X		X	X	X
Planning natural gas infrastructure	X	X	X				X
Representing the state at FERC	X			X		X	

Source: Adapted from California Legislative Analyst's Office (2002), cited in Christopher Weare, *The California Electricity Crisis: Causes and Policy Options*, (San Francisco: Public Policy Institute of California, 2003), p. 104.

APPENDIX C. CALIFORNIA POWER SOURCES GRAPH



Source: QFER, California Energy Commission. September 2002, State of California, Department of Finance, Revised Historical Population Estimates, 1991-2000, with 1990 and 2000 Census Counts. March 2002. Year 2001 & 2002 data are considered preliminary.

APPENDIX D. ENERGY SOURCES

When looking to increase energy supply in California it is important to consider alternative sources of energy in order to create a diversified portfolio. Some alternative sources are already in the California energy market and have potential for future growth. This section examines different types of power plants, power generation, and new technology.

HYDROELECTRIC ENERGY PRODUCTION

Hydroelectric power generation (hydro-electricity) accounted for approximately 11% of California's energy portfolio in 2002. Hydro-electricity comes from the use of falling water to turn a turbine for energy production; it is generally accomplished through the damming or diversion of a river. This form of power generation peaked in the 1950s and 60s as many of California's rivers were dammed to create hydroelectricity generation facilities and also to serve as water storage mechanisms for the state.

The future of this form of energy is uncertain. Most plants were constructed before the California Environmental Quality Act was passed in the early 1970s. It is unlikely that more plants will be permitted in the state under the current environmental permitting process. Furthermore, there are not many sites that are left that would produce a significant amount of energy for the state, since most of the best sites for hydropower are already utilized. In short, there are a finite number of hydroelectricity sources that are available for power production.

The combination of finite resource and environmental impacts make it unlikely for hydroelectricity to significantly contribute to the future supply in California above the status quo. In fact, many hydro sites will come up for environmental review in the next 10 to 20 years and it is possible that we will see this form of power diminish in the future. The increased environmental emphasis placed on the nation's aquatic resources and endangered species make even the status quo energy production in the long term from hydroelectricity uncertain, at best.

GEOTHERMAL ENERGY PRODUCTION

Geothermal power plants harness the earth's heat to produce heat as a form of power and power generation. California is the world leader in this form of energy production, producing over 40% of the world's geothermal energy[49], but this only accounts for approximately 5% of California's energy portfolio. California's geographic location in the pacific 'ring of fire' allows for its high geothermal energy production; it is estimated that geothermal energy has the potential for an additional 4000 MW capacity in the future.

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[49] "Overview of Geothermal Energy in California", *California Energy Commission Homepage*, Page last updated January 9, 2002, <www.energy.ca.gov/geothermal/overview.html>

Power generated from geothermal sources comes in two forms, direct and indirect. Direct geothermal is the harnessing of the earth's heat to directly heat water and/or structures. Indirect geothermal power comes from using the earth's heat to turn a turbine in order to produce electricity. The indirect method can use natural steam or it can harness the earth's heat to boil water to produce steam, which then turns the turbine. Geothermal is considered a renewable source of energy with minimal environmental impacts.

There are negatives to geothermal energy production, however. Transmission is often expensive because locations where the earth's heat can be harnessed are generally not conveniently located to plug into the grid system. Furthermore, areas where geothermal energy production is an option are often found in seismically active regions; e.g. the Long Valley Caldera near Mammoth. Many other areas are environmentally sensitive. There is significant area for growth of this form of energy production, but there are costs and factors to consider when establishing more geothermal energy production facilities.

GASOLINE/DIESEL ENERGY PRODUCTION

Gasoline and diesel energy production currently accounts for less than 1% of the state's energy portfolio. There are many other cleaner production methods of energy production. We believe that with the current dependency on oil from foreign countries, and the air pollution factors associated with this form of energy production, this is not a valid option for the future of California.

HYDROGEN POWER GENERATION

Most of the news concerning hydrogen energy production involves its development as an alternative energy source for automobiles. Its viability in this area and as a large scale electricity provider for the state of California is distant at best. We believe that research should be supported in this area, although this will not be a viable alternative anytime in the immediate future.

NUCLEAR

Nuclear energy is generated in nuclear power plants. Heat is used to boil water into steam, which turns a turbine and drives a generator to produce electricity. The heat comes from the fission of nuclear fuel in a reactor.

Some of the most notable pros that encompass the use of nuclear energy are: nuclear power plants cause only 0.25 percent of our exposure to radioactivity, while medical applications such as X-rays contribute 150 times more, according to figures from Germany[50]; nuclear plants do not emit carbon dioxide or other greenhouse gases; they are more efficient at transforming energy into electricity compared to coal plants; uranium reserves are abundant; and nuclear plants need to be refueled once a year versus coal plants, which need trainloads of coal every day.

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[50] "Sources of Energy: Nuclear," *CBC.ca*, retrieved February 17, 2004, http://www.cbc.ca/news/indepth/energy/nuclear.html.

The biggest drawbacks to the use of nuclear energy include: many Soviet-designed reactors like Chernobyl are outdated and lack containment features, computer-controlled instruments and modern fire-prevention systems; meltdowns result from mechanical and operator failure when coolant escapes into the environment (the Three Mile accident in Pennsylvania resulted from failure to supply coolant); chemical processing of uranium ore leaves residues that can lead to radon exposure to the public; two types of waste are produced: high level and low level, which vary in the level of radiation they produce; and transport of waste poses risk. California also has an additional concern. Though nuclear waste is traditionally buried, the perpetual threat of earthquakes in California makes this unfeasible, and an alternative method to dispose of waste would need to be implemented.

NATURAL GAS

Natural gas, consisting mainly of methane, is a colorless, odorless fuel that burns cleaner than many other traditional fossil fuels. It is used for heating, cooling and production of electricity and it finds many uses in industry. Increasingly, natural gas is being used in combination with other fuels to decrease pollution.

Natural gas is obtained, sometimes along with oil, by drilling into the earth's crust where pockets of natural gas were trapped hundreds of thousands of years ago. Once the gas is brought to the surface, it is refined to remove impurities like water, other gases and sand.

Burning natural gas produces virtually no atmospheric emissions of sulphur dioxide or small particulate matter. Emissions of carbon monoxide, reactive hydrocarbons, nitrogen oxides and carbon dioxide are also lower than those given off when other fossil fuels are burned.

The secret to the low emissions from natural gas is that it is composed mostly of methane. Methane molecules are made up of one carbon atom and four hydrogen atoms. When it's burned completely, the principal products are carbon dioxide and water vapor.

By comparison, oil and coal have much more complex molecular structures that include more carbon, as well as various sulphur and nitrogen compounds. Coal and industrial fuel oil combustion also produces ash particles, which do not burn at all.

Natural gas can be used to generate electricity in a variety of ways. The most basic natural gas fired electric generation consists of a steam generation unit, where fossil fuels are burned in a boiler to heat water and produce steam, which then turns a turbine to generate electricity. Natural gas may be used for this process, although these basic steam units are more typical of large coal or nuclear generation facilities. These basic steam generation units have fairly low energy efficiency. Typically, only 33 to 35 percent of the thermal energy used to generate the steam is converted into electrical energy in these types of units.

Gas turbines and combustion engines are also used to generate electricity. In these types of units, rather than heating steam to turn a turbine, hot gases from burning fossil fuels (particularly natural gas) are used to turn the turbine and generate electricity. Gas turbine and combustion engine plants are traditionally used for peak-load demands, as it is possible to quickly and easily turn them on. These plants have increased in popularity due to advances in technology and the availability of natural gas. However, they are still slightly less efficient than large steam-driven power plants.

Many of the new natural gas fired power plants are known as 'combined-cycle' units. In these types of generating facilities, there is both a gas turbine and a steam unit in one. The gas turbine operates in much the same way as a normal gas turbine, using the hot gases released from burning natural gas to turn a turbine and generate electricity. In combined-cycle plants, the waste heat from the gas-turbine process is directed towards generating steam, which is then used to generate electricity much like a steam unit. Because of this efficient use of the heat energy released from the natural gas, combined-cycle plants are much more efficient than steam units or gas turbines alone. In fact, combined-plants can achieve thermal efficiencies of up to 50 to 60 percent.

Natural gas has many benefits, including easy transportation, wide availability, burning cleaner than coal and oil, and high levels of efficiency. However, although natural gas burns cleaner than coal and oil, it still has emissions. In addition, it is a non-renewable source, meaning that reserves will eventually be exhausted.

RENEWABLE ENERGY SOURCES

In addition to solar and wind, other renewable sources include water, geothermal, municipal solid waste, and other forms of biomass. For the purpose of this analysis we will discuss the two most likely candidates to increase the energy supply in California.

Renewable energy sources have a unique strength not found in more traditional sources – they will never be used up. Other benefits of increasing the use of renewables include less pollution and a decrease in dependency on imported fuel. During the 1970s, interest in renewable energy sources grew. In the 1980s, California promoted renewable energy by offering tax credits and financial incentives. However, the tax credits for wind energy has since ended and competition and pricing policies consequently began to evolve in the electric utility industry. In addition, the price of natural gas was declining and renewable facilities had trouble competing in electricity markets based on price alone. In 1998, solar and wind energy only supplied .05% of all energy produced, most of which was wind energy. [51]

There are certain issues as to why there has not been a sharper increase in the usage of solar and wind energy. Although the fuel is free, renewable energy is not cheaper than fossil energy. Some reasons for this include: deregulation of the oil and gas market, as well as loosening of the electricity market, which has made energy from non-renewable fuels cheaper; fossil fuels have a solid lead in research and development; and the use of fossil fuels gets more efficient over time.

A second major drawback to the growth of solar and wind energy is that both have a timing problem; the sun does not necessarily shine and the wind does not necessarily blow when humans need energy the most. Due to the overabundance of sunny days in southern California, the first would be a non-issue.

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[51] Bjorn Lomborg, *The Skeptical Environmentalist: Measuring the Real State of the World*, (Cambridge University Press, 2001), p. 129.

SOLAR

Recently the solar industry, especially the photovoltaics (PV) segment, has reduced product prices substantially. In addition, there has been major progress made in areas of performance, reliability, costs, and consumer acceptance. Although there is a high initial cost to install solar energy, it has been proven to drastically reduced energy bills in the long run, which is great news for consumers.

Studies show that for every $1 saved on an annual fuel bill due to energy efficient home improvements, one's home value will jump $20 or more.[52] Solar electricity is cost effective because a solar electricity system will supply a home with electricity which will cost less than 25 percent of the mutli-tiered rates an individual currently pays. Net savings will be experienced in the first year and although property value will increase as a result, due to legislation, property taxes will not be affected.

There are other benefits that come with solar energy. Solar energy has huge environmental benefits including: keeping air clean, reducing production of carbon dioxide, it is clean and quiet, saving natural resources, reducing consumption of fossil fuels, and reducing the need for polluting power and additional infrastructure.

WIND

Wind power plants are turbines which use the energy in the motion of the wind to make mechanical energy, which is then converted to electrical energy. The greatest advantage of wind power is its potential for large-scale electricity generation without emissions. Improvements in technology have led to a reduction in production and maintenance costs. At more efficient wind sites, electricity generation form wind power costs around 4 cents per kilowatt. In 2000, wind energy in California produced 3,064 million kilowatt-hours of electricity – 1.27% of California total.[53]

Wind power plants can be built in small modular units within a relatively brief two year period. They offer power suppliers greater flexibility than plants that can only be built in large sizes over longer periods of time.

Due to the intermittent nature of wind, a power plant's economic feasibility strongly depends on the amount of energy it produces. Other concerns associated with wind energy are its requirement for large tracts of land, erosion in desert areas, visual qualities, wildlife habitats disturbed, avian mortality, noise, and grass/brush fires. These issues can be solved by placing wind plants out at sea. This will eliminate the aesthetic problems, increase effectiveness by 50 percent, and reduce the number of birds killed.

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[52] "Costs and Savings", *Borrego Solar Systems, Inc. Homepage*, Retrieved February 17, 2004, <http://www.borregosolar.com/Costs.html>

[53] "Wind Energy in California", *California Energy Commission Homepage*, Retrieved February 22, 2004, <http://www.energy.ca.gov/wind/overview.html>

TECHNOLOGICAL ADVANCES

COGENERATION

Cogeneration is a technology in which both heat and power are produced by a single thermodynamic process. The process of cogeneration, also known as Combined Heat and Power (CHP), was first developed in the early seventeenth century. Since then, manufacturers have used hot water condensers powered by secondary heat from steam engines to utilize otherwise wasted energy.

Common to all systems of cogeneration is the "prime mover". It either converts waste heat into power or generates heat and power from a single energy input. The idea behind cogeneration is to utilize energy given off by conventional generation. Conventional production only allows about a third of a fuel's potential energy to be converted into usable energy.

Although the concept of cogeneration is moving forward, there are still some obstacles that are hindering its progress. A key obstacle is the environmental permitting process which is long, complex, and costly. Financial feasibility is a second obstacle. Cogeneration technologies are typically very expensive and therefore cogeneration is possible only for the largest consumers of electricity. In addition, utilities view cogeneration producers as competitors and have subsequently charged them higher fees for power and have been unwilling to buy back excess electricity at fair market value. These issues lead to the hesitancy of future cogeneration producers to make such large capital investments.

However, the U.S. Department of Energy and the Environmental Protection Agency are making efforts to increase the use of cogeneration technology. The present goal is to double CHP capacity by the year 2010, thus adding an estimated 50 GW of capacity. Many California companies are researching and investing in CHP technologies. Currently, cogeneration amounts to 12% of the total "native" generation located within the California Independent Systems Operators (ISOs)

CLEAN COAL TECHNOLOGY

Clean Coal Technology (CCT) is a term used to describe a variety of innovations that have occurred, continue to be researched, and are now being implemented in the way we use coal as a source of energy. Throughout the 1980s and 1990s more than 20 new successful methods have been used commercially. This is extremely important due to the fact that half of the electricity produced in the United States comes from coal.

The first Clean Coal Technology Program was started in 1986 to address the problem of acid rain. It focused on reducing sulfur dioxide and nitrogen oxide emissions. It also focused on mitigating health concerns that were said to be created by trace elements of mercury. The early project was also charged with looking into the effects of climate alteration due to greenhouse gases. Since then, the greatest progress has been made in the reduction emissions. Technological progress has also been made in making generating systems more efficient.

There have been a variety of government initiatives taken to further the progress of Clean Coal Technology. In particular, President Bush has been an advocate of this technology and has highlighted CCT as integral part of his Clear Skies Initiative that aims to reduce sulfur, nitrogen and mercury

pollutants by 70% from power plants by the year 2018. Other government supports include the Clean Coal Power Program (CCPI), which aims to reduce and eventually eliminate trace elements of mercury and carbon dioxide, as well as increase efficiency. The Department of Energy is sponsoring a Presidential initiative called "SuperGen." This is a $1 billion project that aims to create the first emission free plant to produce electricity and hydrogen using coal.

POWER GENERATION

SIMPLE CYCLE

Uses gas to operate a turbine to generate electricity – does not recycle waste heat.

COMBINED CYCLE

Uses gas to operate a turbine to generate electricity and recycles its waste heat by using it to produce steam. It then uses the steam to operate conventional steam turbines to produce more electricity.

COGENERATOR

Uses waste heat created by one process (for example, manufacturing) to produce steam that is used to operate a turbine and generate electricity. It can also use gas to run turbines using the steam to generate electricity.

PEAKER PLANT

A simple cycle power plant that is normally used to produce electricity during peak time loads.

APPENDIX E. ENERGY ASSISTANCE PROGRAMS[54]

Low Income Home Energy Assistance Program (LIHEAP) is a federally funded program that helps low-income households with their home energy bills. The federal government does not provide energy assistance directly to the public – each state has its own program. The LIHEAP program offers the following assistance: bill payment, energy crisis, and weatherization and home energy repairs.

Within the state of California there are several existing low income programs to provide support. These include: California Alternative Rates for Energy (CARE), Low-Income Energy Efficiency Program (LIFE), and a variety of programs offered by the LA Department of Water and Power.

CARE provides a rate discount for eligible low-income customers of the investor-owned electric and natural gas utilities. It is funded through a rate surcharge paid by all utility customers.

LIFE provides no-cost weatherization services to low-income households who meet the CARE income guidelines. Some services provided include attic insulation, energy efficient refrigerators, weather-stripping, and low-flow showerheads.

Programs offered by the LA Department of Water and Power include: Project ANGEL "Assist Neighbors by Giving Energy for Living"; Energy Use Analysis; Senior Citizen Lifeline Rate; Residential Low Income Rate; and Payment Extensions.

- Project ANGEL is designed to assist low-income and elderly unemployed DWP residential customers meet their energy and water needs. Specifically it is designed to aid those who are not eligible for other aid and welfare assistance.

- Energy Use Analysis provides information on how to make a home more energy efficient, thereby saving people energy and money. Included in this is a free Home Energy Survey performed by a DWP employee.

- The Senior Citizen Lifeline Rate helps senior citizens financially by applying a discount to their energy bill. Any DWP customer who is 62 or older with an annual household income of less than the allowed maximum is eligible for the discount.

- Residential Low Income rates reduce the cost of electricity up to 15 percent for those customers within qualifying income levels. "Income" refers to the total income of all persons living in a household.

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[54] Dennis Osmer, "Implications of the Energy Crisis for Low-Income Households in California," *California Senate Office of Research Homepage*, June 19, 2001,
<http://www.sen.ca.gov/sor/policy/energy/LOWINCOMEUPDATED.HTM>

- In addition to the above services, the DWP will work with customers to set up payment plans, if they experience difficulty in paying their bill.

These are just a few of the many ways Californians can be assured they will always be able to afford energy.

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