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The Economic and Environmental Impact of the California Environmental Quality Act

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Economy: Comparing California before and after the 1970 passage of the California Environmental Quality Act (CEQA), and benchmarking against performance in the other 49 states, this study finds that 1) California per capita GDP, 2) California housing relative to population, 3) California manufacturing output and 4) California construction activity grew as fast or faster after the passage of CEQA.

Environment: In the specific case of power plant construction, since 1970, California shifted to less polluting natural gas electrical generation sooner and went farther in this direction compared to the rest of the U.S. California also shifted sooner (in the 1980s and thereafter) and has gone farther in its reliance upon renewable and other non-traditional energy sources to generate electricity compared to the rest of the U.S.

Case Studies: Three case studies are presented. First, CEQA's role in the ending of proposals to build coal-fired power plants in California helped introduce the first significant corporate-utility commitments to non-hydroelectric renewable energy generation in the U.S. Second, CEQA's role in helping shift the ports of Los Angeles and Long Beach from a model of dirty growth to a model of green growth, first through the land-side electrification of docked ships (beginning in 2003), and then, as one legal basis for the ports' Clean Air Action Plan (2006), resulted in reversing a projected doubling of port pollution from 2000 to 2020 to a 40% to 80% reduction in port pollution from 2005 to 2011. Third, CEQA's role in stimulating a California Energy Commission policy (2003) of discouraging wet cooling and encouraging the dry cooling of inland natural gas power plants helped stop a licensing practice which over the decade 1996 to 2005 had committed 100,000 acre feet of fresh and recycled water to wet cooling of inland thermal power plants.

Keywords: economic development, environment, California
JEL Classification: O1 - Economic Development; O2 - Development Planning and Policy; O44 - Environment and Growth

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CEQA

The Economic and Environmental Impact of the California Environmental Quality Act

Quantitative Analysis and Case Studies

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Abstract

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Executive Summary

1) California Economy Has Experienced Robust Growth Since CEQA (1970)

Claims have made that CEQA has inhibited California's economic growth. Our research shows that California has grown as fast or faster than the rest of the US since CEQA became law.

Per Capita GDP	Housing	Manufacturing	Construction
• Except in the 1990 and 2008 recessions, CA per capita GDP grows faster than US since 1970	• Before CEQA CA housing keeps pace with population growth and this conintues after CEQA	• Steady from 1961-75, California's share of US manufacturing output grows after 1975	• California's share of US construction falls from end of WWII to 1975 but grows from 1975 to present

CALIFORNIA GDP PER CAPITA

Since CEQA (1970) with the exception of the 1990 and 2008 recessions where California was hit harder, California per capita GDP growth has typically exceeded US per capita GDP growth.

CALIFORNIA HOUSING

For 5 decades, 1961 to 2011, California's share of US housing and California's share of US population have tracked together. There is no reason to believe that CEQA has stymied California housing growth.

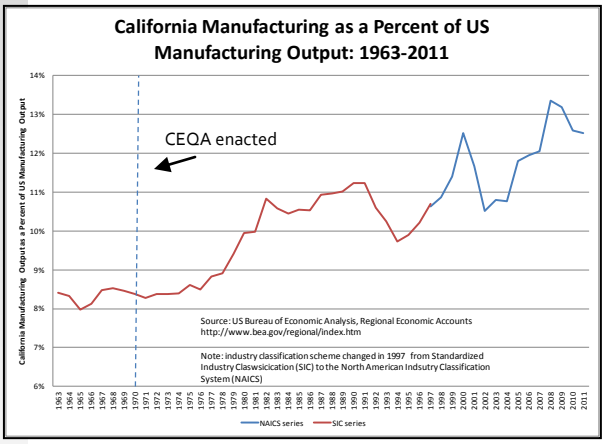
CALIFORNIA MANUFACTURING OUTPUT

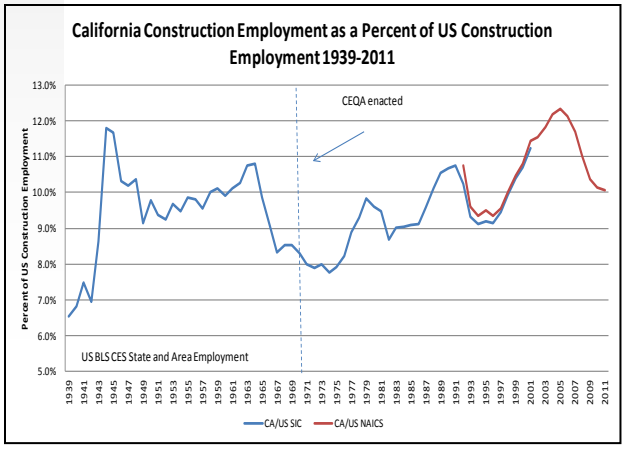
Since the mid-1970s, California's share of U.S. manufacturing output has grown from 8% to about 13% of all manufacturing. CEQA by promoting a cleaner California environment may have actually helped high tech, bio-tech and other industries attract professional and technical labor.

CALIFORNIA CONSTRUCTION

During World War II, California war related construction doubled the state's share of U.S. construction employment from about 7% to just under 12%. After the war, California's share of U.S construction fell first to around 10% and then to 8% by the time CEQA was passed (1970).

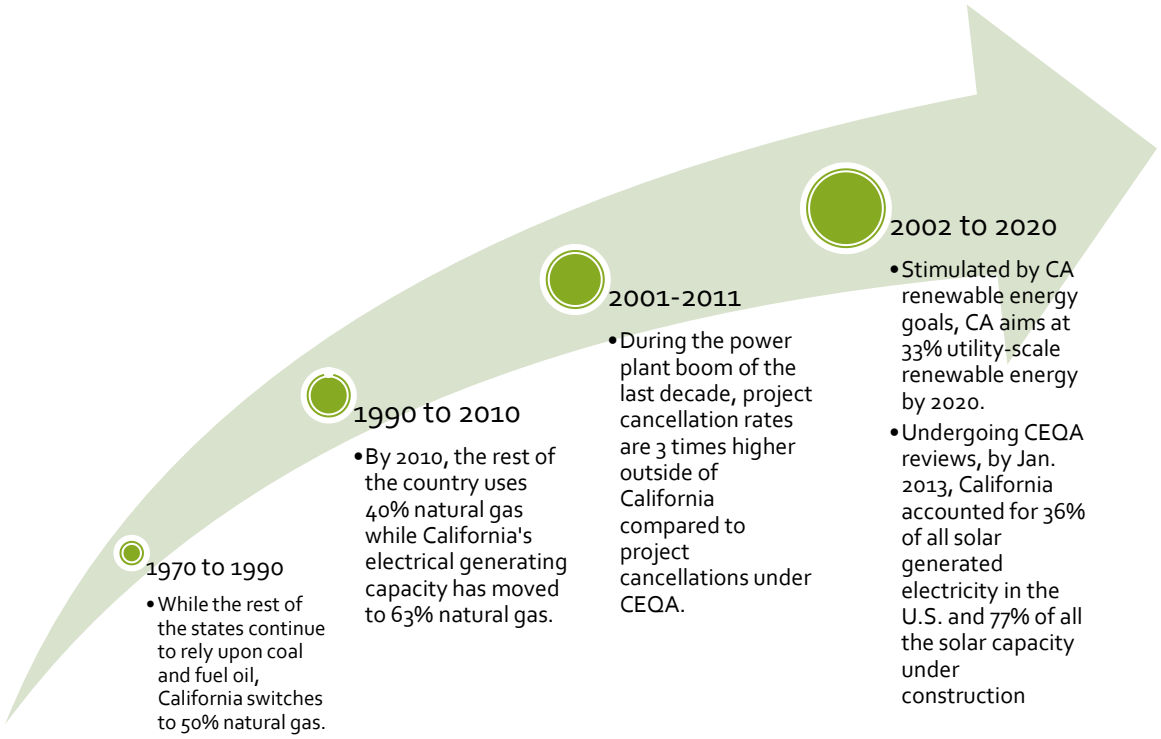
From the mid-1970s to 2006, California's share of U.S. construction rose to above the WWII peak. While the Great Recession has hurt California construction more, California's share of U.S. construction (10%) is still 25% higher than in 1970 (8%).





2) Since 1970, California Has Led the U.S. in Building Greener Power Plants

Claims have been made that CEQA has hampered large projects. Our research shows that in the case of large power plants, CEQA has fostered robust clean energy growth with fewer cancelled projects than elsewhere in the U.S.



CEQA DOES NOT STOP GAS-PLANT GROWTH

POWER PLANT BOOM 2001-2011

In the decade 2001 to 2011, thermal power plant construction grew in both California and the rest of the U.S.

CANCELLATION RATE 3 TIMES HIGHER OUTSIDE OF CA

Outside of California, 60% of planned power plants are cancelled or permanently postponed.

Inside California, about 20% are cancelled or postponed.

Plants may be cancelled for environmental, economic and/or logistical reasons. California power plants may have been better planned along all these dimensions leading to fewer cancellations.

CEQA DOES NOT STOP SOLAR GROWTH

CA RENEWABLE ENERGY GOALS

California set a goal of sourcing 33% of its utility-scale electrical generation from solar, wind and geothermal by 2020.

By 2013, the three main utilities (PG&E, SCE and SDG&E) were all about 20% renewable-energy based.

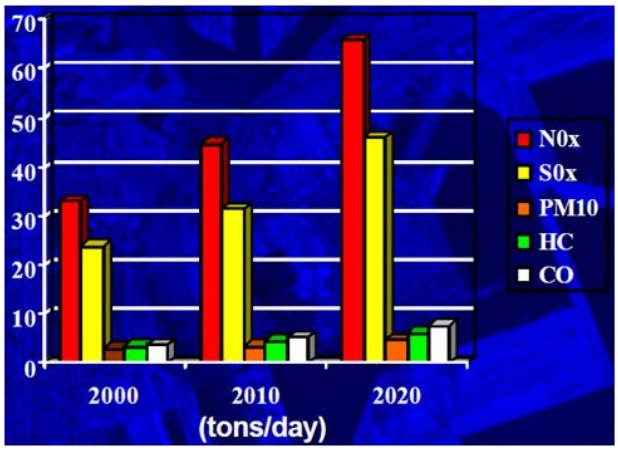
CALIFORNIA SOLAR BOOM NOT HAMPERED BY CEQA

All proposed utility-scale solar electrical generating facilities in California must go through a CEQA process.

By January, 2013, California accounted for 36% of all utility-scale, solar-generated electricity and 77% of all utility-scale solar capacity under construction.

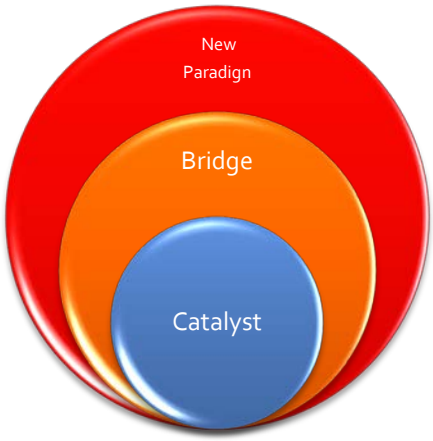
3) Catalyzed by a CEQA Lawsuit, Bridging Fragmented Local, State, National and International Jurisdictions, CEQA Provides a Legal Footing for a New Paradigm of Green Growth for the Ports of LA and Long Beach

Dirty Growth: in 2002 port pollution projected to double. Green Growth: after CEQA intervention, pollution falls 40% to 80%.



Catalyzing Change; Bridging Jurisdictions; Creating a New Paradigm of Green Growth

A 2002 CEQA lawsuit against the ports of LA and Long Beach led to land-based electrification of docked ships and to the promulgation of the ports' 1996 Clean Air Action Plan. CAAP bridges the fragmented and frustrated environmental jurisdictions overseeing the ports. A new paradigm of green growth and stakeholder communication emerges. Where once port pollution was expected to double by 2020, emissions actually fell by 40% to 80% by 2011.



FROM DIRTY TO GREEN PORT GROWTH

DIRTY GROWTH

For decades, growth and pollution went hand in hand for the LA and Long Beach ports which accounted for 10% of all LA Basin pollution by the early 2000's.

CATALYST FOR CHANGE

A 2002 CEQA lawsuit brought by port communities and environmental groups leads to the land-side electrification of docked ships eliminating dirty diesel onboard electrical generation.

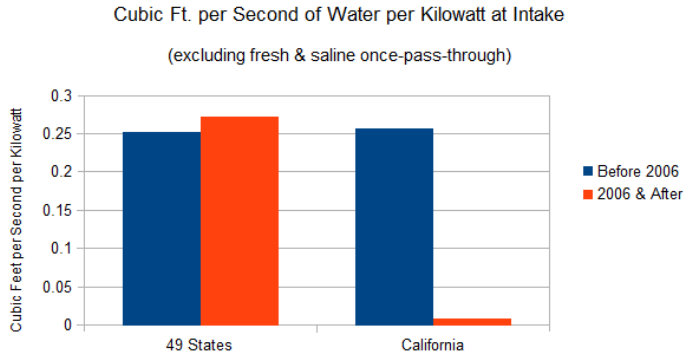
BRIDGING JURISDICTIONS

Faced with fragmented and frustrated local, state, national and international environmental regulators, CEQA responsibility and port-landowner rights provide the legal foundation for a 2006 port Clean Air Action Plan.

NEW PARADIGM OF GREEN GROWTH

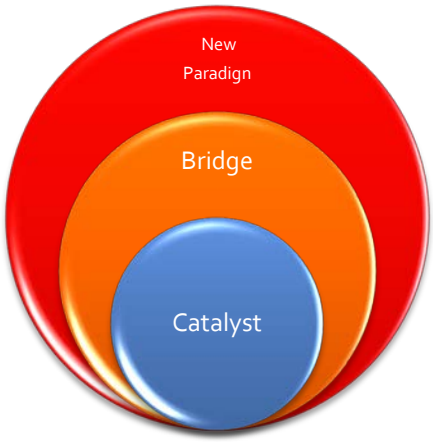
In 2002, port emissions were projected to double from 2000 to 2020. After CEQA and CAAP, port emissions actually fell by 40% to 80% from 2005 to 2011

4) Catalyzed by a CEQA Agreement, Bridging CEC and State Water Board Policies, CEQA Helps Move California to a New Paradigm of Dry Cooling



Catalyzing Change: Bridging Jurisdictions

A 1998 CEQA intervener argued for dry cooling gas power plants. The developer agreed. This brought to the CEC's attention a 1976 State Water Board policy discouraging wet cooling of inland power plants. By demonstrating the technical and economic soundness of dry-cooling, this new plant led the CEC to promote dry cooling. CEQA stimulated the CEC to notice that while water districts were sometimes selling water based on 20 year horizons and local availability, power plants were taking water based on 30 to 50 year plant lifetime. CEQA helped the CEC switch perspectives to a longer and wider horizon regarding water usage and power plants.



WET VS. DRY COOLING OF POWER PLANTS

1996 TO EARLY 2005

During this natural-gas power plant boom, CEC licensing approvals committed almost 100,000 acre feet of inland fresh and recycled water annually to the wet cooling of new plants. This new addition 1.7 times greater than all the inland water used for wet cooling in the 1970s

CEQA INTERVENTION 1998

An agreement between a CEQA intervener and plant developer to dry-cool the Sutter power plant eventually leads to the elimination of almost all inland wet cooling.

ONCE THE SOLAR BOOM IS OVER GAS WILL LEAD

Once California reaches its 2020 goal of 33% renewable, utility-scale energy generation, dry-cooled natural gas will again come to the fore.

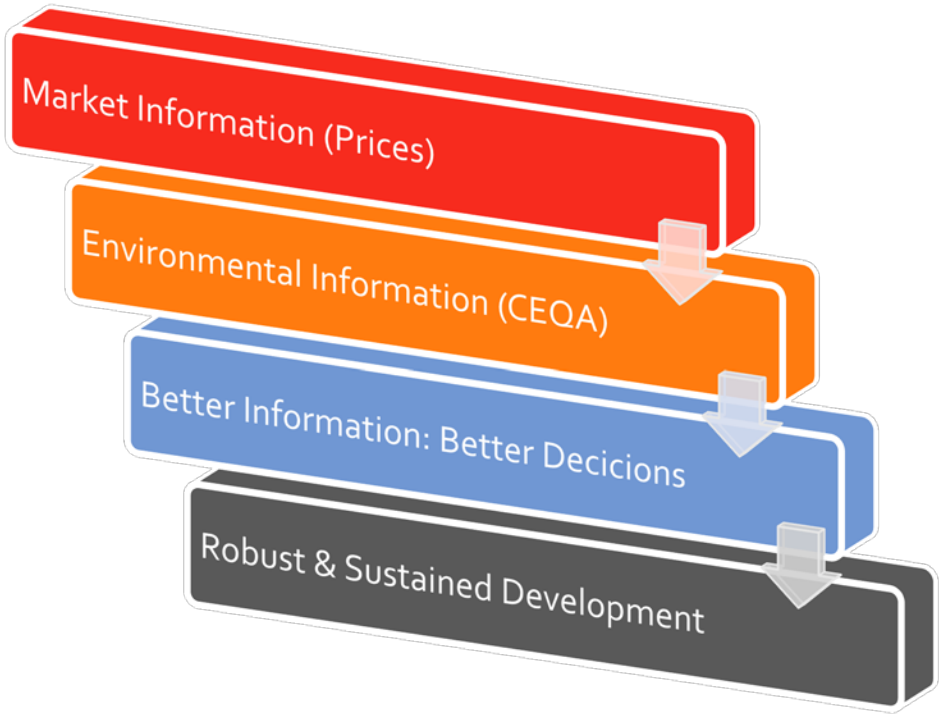
200,000 ACRE FEET SAVED OVER 20 YEARS

By about 2035 dry-cooling may save California as much as 200,000 acre feet of water annually making this fresh and recycled water available for other uses. This assumes that California does not increase its renewable portfolio requirements substantially. But even if the renewable mandates are raised, natural gas generation will remain an important complementary source. This means that dry cooling will have a lasting impact easing the availability of inland water.

5) Economic and Environmental Goals Are Not Tradeoffs: They Are the Two Legs Needed to Scale the Challenges of Robust, Sustainable Development

CEQA is a process. It provides stakeholders and the public legal standing in the process of permitting the construction of projects that hold the potential of having a negative environmental impact. CEQA requires the creation of an environmental impact report designed to identify the environmental costs of the project. The public is invited to evaluate, criticize and add to the preliminary environmental report so that a better and fuller understanding of the environmental costs of a project can be added to the more easily obtained market costs of the project. In this manner, decision makers obtain a complete accounting of the true overall economic costs of the project where environmental costs of all sorts are part of the fuller picture of economic costs. This then allows developers, the public and regulators to better understand where the project is taking all of us and whether other paths or other ways of going down the proposed path make sense.

CEQA has benefitted the California environment without hampering economic development. There is no mystery in this fact even though to some this result seems like a paradox. Ultimately, economic development is a process of picking and choosing among competing paths forward. Fully informed choices about which path to take are always better than choices made with limited or partial or misleading information. On a project-by-project basis, CEQA makes for better choices by letting more voices be heard, putting more information on the table, and letting a fuller calculation of the true price of each project and its alternatives be considered.



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About the Author and Acknowledgement

Peter Philips is a Professor of economics and former Chair of the Economics Department at the University of Utah. Professor Philips is a recognized expert on the U.S. construction industry. Philips received his B.A. from Pomona College and his M.A. and Ph.D. from Stanford University. This study was sponsored by a grant from the California Construction Industry Labor Management Cooperation Trust.

The California Environmental Quality Act—CEQA

The current Wikipedia entry on CEQA summarizes the law as follows:

> The California Environmental Quality Act (CEQA) is a California statute passed in 1970, shortly after the United States federal government passed the National Environmental Policy Act (NEPA), to institute a statewide policy of environmental protection. CEQA does not directly regulate land uses, but instead requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects and adopt all feasible measures to mitigate those impacts. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process. It has also become the basis for numerous lawsuits concerning public and private projects.

There is some controversy regarding this last statement that CEQA has been the basis for numerous lawsuits. In an early study of CEQA, Olshansky and Landis (1995) examined 354 CEQA projects approved by planning departments and found that only one (0.3%) of these approvals was challenged in court.[i] A very recent study found similar results: of 1182 CEQA applications filed in Los Angeles from January 2011 to July 2012, only 18 (1.5%) were subject to at least an initial stage of litigation.[ii] So "numerous" lawsuits under CEQA is a matter of interpretation. We need not decide this controversial point here. For our purposes, it is enough to say that there are some lawsuits associated with CEQA and the requirement that non-exempt projects provide environmental impact reports along with these lawsuits provide the teeth for the public through their CEQA rights to have some bite.

CEQA is the California law that induces state and local public agencies to consider the environmental impacts of projects they, themselves, are considering and private projects over which they have permitting or approval responsibility for a proposed project. So CEQA helps with two important things: CEQA helps get environmental costs on the table when projects are being contemplated, and CEQA allows for potential environmental costs to be nipped in the bud through the consideration of alternative approaches to the proposed project or alternative project specifications or other feasible mitigations. Potential environmental costs get on the table through the creation of an environmental impact report (EIR) which is a public document available for review and comment by all interested or potentially impacted parties. This establishes a public dialogue regarding proposed projects wherein the public agency is required to provide written responses to public comments. Often, this interaction leads the public agency to require of the project developers various amendments to their project to mitigate environmental impacts that have emerged either from the EIR or from the subsequent public comments.

The purview of CEQA is the full range of environmental impacts that proposed projects can plausibly have. Air pollution, exposure to toxic chemicals, ground water pollution, resource protection, oil spills, noise pollution are among the full range of issues that may be considered under CEQA. CEQA is the primary law that induces public decision makers to understand, consider and balance environmental considerations with other economic and political considerations in evaluating the costs and benefits of prospective projects. CEQA also is a stitch-in-time law that puts environmental considerations into calculations before projects are built when mitigation is least expensive and most easily and conveniently done. CEQA is also a fill-in-the-gap environmental law where standards under other environmental regulations are absent, lax or hobbled by loopholes or competing jurisdictions. And CEQA is a complementary environmental law allowing the environmental regulation of on-going industrial and other processes to be brought forward to the moment these industrial and other facilities are approved.

Introduction

This study asks two questions: 1) what has been the California Environmental Quality Act (CEQA)'s effect on the California **economy**? And 2) what has been CEQA's effect on the California **environment**? These are foundational questions in any evaluation of the merits of this law. Surprisingly, however, little has been done previously to systematically answer these questions. Much has been said in a general way that CEQA has been good for the environment. Much has been said in particularistic ways asserting that CEQA has been good for this specific development project or bad for that specific project. This study seeks to improve on existing research by addressing jointly with both quantitative analysis and cases studies the dual questions of what has CEQA's impact been on California's economy and environment.

CEQA is not, in itself, a set of environmental rules. Rather, CEQA is a procedural requirement that insists that the public be let into the process of assessing the environmental impact of proposed projects. It also requires that where feasible, negative environmental impacts of proposed projects be mitigated in one fashion or another. Thus, under CEQA, the public has a certain amount of leverage in suggesting alternative approaches to a project or possible mitigations for prospective environmental harm. Because CEQA involves process, one is naturally drawn to case studies of particular processes to get a sense of how CEQA conjoins with regulators and lead agencies in forming environmental protection in California. And we will visit three CEQA cases to get this sense. But this study also seeks to expand on the particularistic assessments of CEQA's impact on specific projects by broadening the analysis from the granular detail of proposed projects to the more general level of analysis, California's environmental and economic development in general.

Notably absent in previous assessments of CEQA's impact on either the environment or the economy has been benchmark references either to what occurred in California prior to CEQA's enactment in 1970 or to what has occurred outside of California and consequently outside of CEQA's oversight since CEQA's passage. In this study, subject to data availability, we will do both—benchmark CEQA within a before-and-after and here-and-there set of comparisons which helps to better understand the independent impact of CEQA on California's environment and economy.

In doing this, we must remember that California's environmental protection walks on two legs—rule making and public involvement. These legs come together at the point a proposed project is licensed or permitted. As a consequence, environmental protection has never been CEQA's alone nor has it been rules alone. But these two dimensions walk together and interact. Indeed, in some instances, public participation leads to rule changes. And in other cases, CEQA provides the sinews to bind together rules from competing jurisdictions into a better, more coherent oversight guiding towards green growth. We will see case-specific examples of these below.

Less concrete, but perhaps ultimately more meaningful, CEQA invitation to substantive public involvement in assessing the potential environmental impact of specific projects creates an ethos just the opposite of the old saw "the public be damned!" Rather with CEQA, the ethos is "the public must be considered." And while it is difficult to measure with precision this sea-change in perceptions, the fact that over the 40 years of CEQA it has become clear that the public and its environmental interests will be heard has helped internalize the environmental costs of projects to the projects themselves. And this is precisely what economists will say needs to be done to replace dirty growth with green growth.

Economic Development

We investigate the impact of CEQA on California economic development by examining overall through the lens of a) the growth in per capita gross domestic product in California compared to the U.S., b) new housing in California compared to

the rest of the U.S., c) manufacturing output in California compared to the rest of the U.S. and d) construction activity in general in California compared to the rest of the U.S. All of these comparisons between California and the rest of the U.S. will be done for both before and after the passage of CEQA. Thus, we will be able to gauge CEQA's effect on California economic development by benchmarking California development after CEQA against both California economic development before CEQA and against economic development elsewhere in the U.S.

We also look specifically at electrical generation because a) new construction in electrical generation is impacted by CEQA requirements, b) data are available to compare the growth of California electrical generation compared to the U.S. as a whole, and c) we can also measure and compare projects that were envisioned, sought regulatory approval, received regulatory approval, began construction or alternatively were cancelled or indefinitely postponed. So in this specific case, we can directly address the question, compared to the regulation of this industry elsewhere in the U.S., does CEQA lead to more postponements and/or cancellations of projects?

In addition, we will also look at the recent permitting of solar electrical generating facilities in California compared to elsewhere to see if CEQA has hampered the growth of solar power in California.

The answer to the questions 1) what has CEQA effect been on the overall California economy? 2) what has CEQA effect been on the building of California power plants? and 3) what has CEQA's effect been on the recent development of solar electrical generating facilities? will contribute an overall evaluation of the costs and benefits of this law.

In addition, we will specifically address a discussion mentioned above regarding whether CEQA leads to numerous growth-stopping lawsuits. The problem with that discussion is, in part, that it does not benchmark CEQA lawsuits against comparable disputes in other jurisdictions. Data in this report will benchmark postponements and cancellations in California electrical generation projects against postponements and cancellations elsewhere in the U.S. during the same time period and comparable economic conditions.

The Environment

Having asked the question—what has been CEQA's effect on the development of the California economy, in general, and the growth of electrical generating capacity in California, in particular, we, in turn, ask the question what has the CEQA-influenced development of California's electrical generation done to the California environment?

Since 1975, the licensing of larger thermal power plants[1] of 50 megawatts (MW) or more in California has been the purview of the California Energy Commission (CEC). The CEC says of itself:

> The California Energy Commission has the statutory responsibility for licensing thermal power plants 50 megawatts and larger and the plants' related facilities such as transmission lines, fuel supply lines, water pipelines, etc. The Energy Commission's 12-month, one-stop permitting process is a certified regulatory program under the California Environmental Quality Act (CEQA) and includes many opportunities for public participation.[iii]

In licensing these larger, thermal power plants, CEQA is the handmaiden of the CEC helping to shape the form and function of the many opportunities for public participation.[2] Thus, as noted more generally above, in analyzing the CEQA's influence on the environmental impact of California's evolving electrical generating facilities, we are in fact measuring the joint impact of CEQA and the CEC as well as the permissible and sometimes required involvement of other related

[1] Thermal power plants use fuel to create steam. This would include coal, natural gas, nuclear and geothermal powered plants as well as thermal solar plants but not include wind facilities or hydroelectric dams.
[2] Licensing of smaller power plants and non-thermal plants such as wind and solar photovoltaic is done by local governments which also must invoke a CEQA process.

governmental agencies such as local air districts. CEQA allows agencies, organizations and individuals to intervene in a licensing process providing evidence, arguments and witnesses. CEQA not only allows the public to become an explicit part of the licensing process, but CEQA also creates the ever-present possibility of public involvement. Thus, in preparing a power plant proposal, would-be operators may well shape their original proposals anticipating public concerns.

Taken together, the data-driven answers to these questions will help us better understand more precisely what CEQA has wrought both with regards to California's environment and California's economic development. We then turn to three case studies of particular CEQA interventions—two are power plant cases involving three proposed coal-fired power plant projects in the 1970's and a proposed wet-cooled, inland power plant in the late 1990's. The third case involves a CEQA lawsuit and the subsequent transition of the ports of Los Angeles and Long Beach from a paradigm of dirty-growth to green-growth. These case studies help reveal the three potential roles CEQA can play—as a catalyst for change; as a bridge linking fragmented and potentially conflicting environmental regulatory jurisdictions, and a force for paradigmatic change in the way economic growth and environmental management are harmonized. But, we begin here with the question of CEQA's impact on overall economic growth in California.

CEQA's Effect on Economic Development in California

Has CEQA's contribution to a cleaner California environment come at the cost of stunted economic growth? This question will be asked and answered below in the particular case of California's electrical generation capacity. There we will find no evidence that California's construction of new generating facilities has been slowed by CEQA. But what about more generally? Has California overall economy or California's construction economy or California's industrial construction economy been hampered over the last 40 years due to CEQA? We begin to address this question by looking at per capita gross state domestic product (GDP) in California since 1963, the earliest available data.

Real per Capita GDP Growth

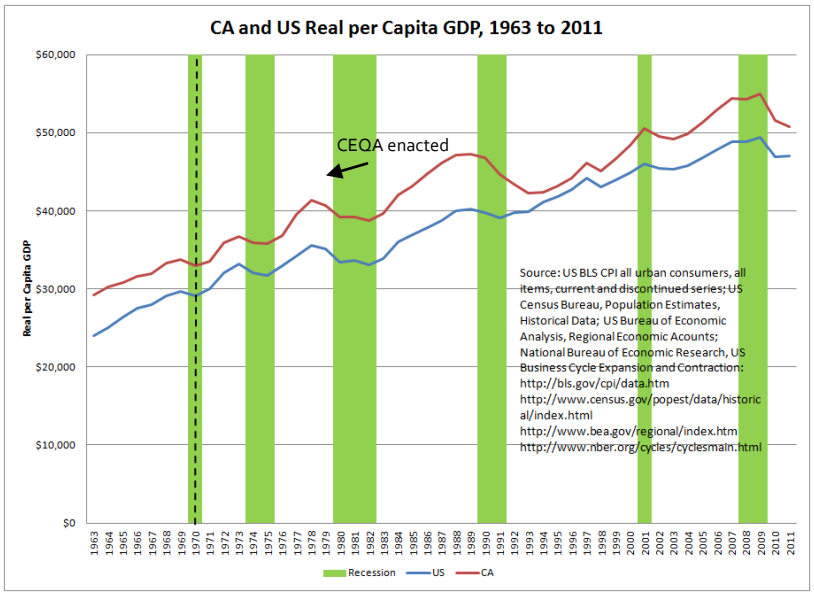

FIGURE 1: U.S. AND CALIFORNIA INFLATION-ADJUSTED (REAL) GDP FROM 1963 TO 2011

Figure 1 shows that the growth in California inflation-adjusted per capita GDP since 1963 generally outpaced U.S. per capita GDP growth. In the short pre-CEQA period for which we have data, California and the U.S. per capita GDP grew roughly in tandem. From the passage of CEQA in 1970 to just before the 1990 recession, California GDP growth measurably outpaced GDP growth for the U.S. as a whole. The 1990 recession was particularly hard on California and by the early 1990s, California had lost most of its advantage over the rest of the U.S. in per capita GDP. However, from the middle of the 1990s until the Great Recession in 2008, California again outpaced the rest of the U.S. in per capita GDP growth. The Great Recession has again been harder on California than the nation as a whole with California per capita GDP falling faster than U.S. per capita GDP since 2009. What we see in these data is that since CEQA (and probably before), California has grown faster than the rest of the U.S. but in serious economic crises, California falls harder than the rest of the U.S. What we do not see is any apparent hobbling of California per capita economic growth due to the CEQA process. We now will take a close look at specific areas of economic growth—first housing, then manufacturing, and then construction.

Population and Housing

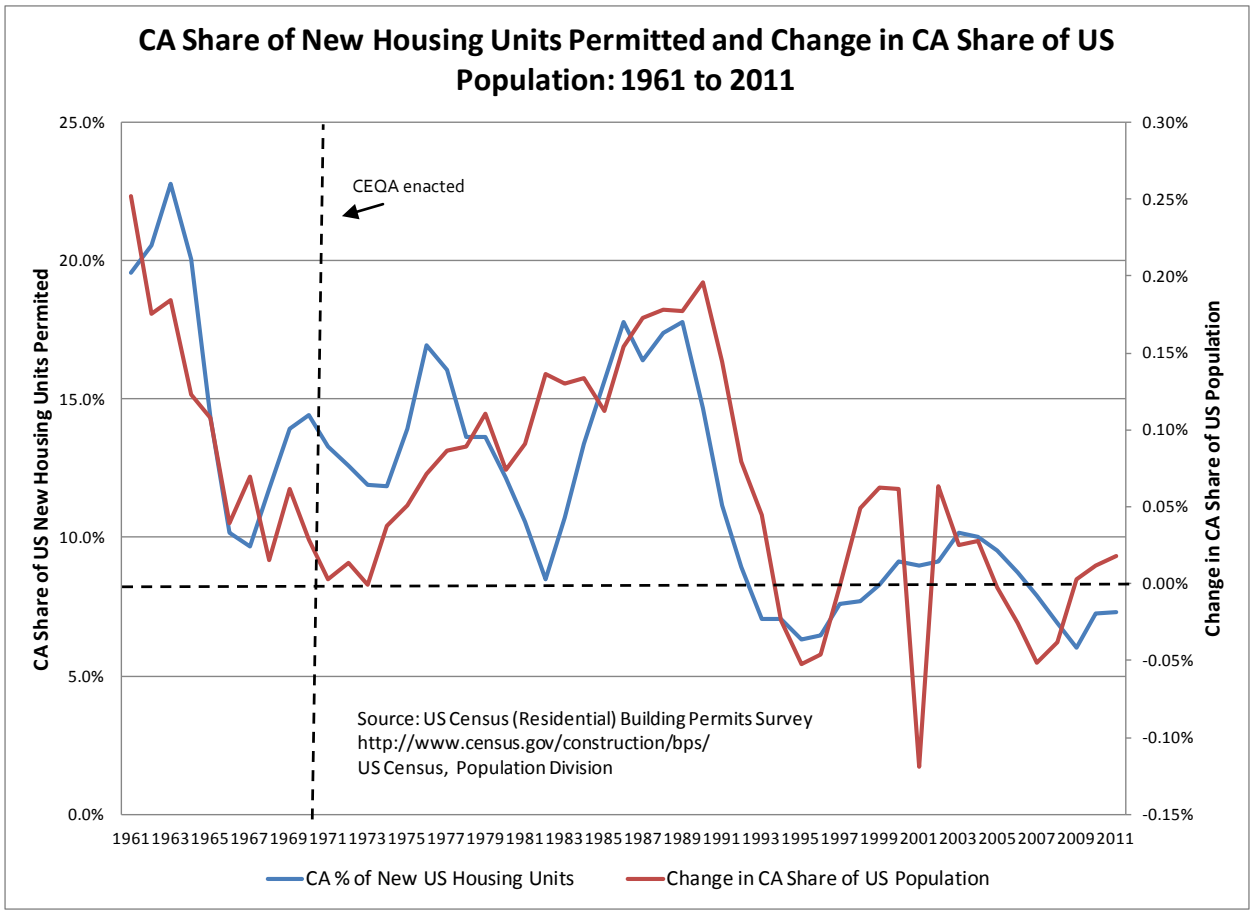

FIGURE 2: CALIFORNIA'S SHARE OF NEW HOUSING UNITS IN RELATION TO CALIFORNIA'S SHARE OF U.S. POPULATION

With population growth comes new housing. California's population grew faster than the overall U.S. population both before and after the 1970 enactment of CEQA until the recession of 1990. Thereafter, California's population continued to

grow but at a pace that roughly equaled U.S. population growth.[iv] Figure 2 shows that California's growth in new housing has kept pace with California's growth in population.

On the left hand axis in Figure 2, we measure California's share of new housing unit permits. The data begin in 1961. On the right hand axis, we measure the change in California's share of the U.S. population. The vertical dashed line is set at 1970, the year CEQA was enacted. The horizontal dashed line is set at zero on the right hand axis. When the red growth-in-population-share line is above the horizontal dashed line, California's share of U.S. population is growing. When the red growth-in-population-share line is below the horizontal dashed line, California's share of U.S. population is falling. When it is on the horizontal dashed line, California's population is growing at the same pace as the U.S. population implying that California's share of the U.S. population is stable.

Following the red growth-in-population-share line, we see that from 1961 to the passage of CEQA in 1970, California's population was growing faster than the rest of the U.S. (the red line is above the horizontal dashed line). But California's relative growth was slowing. Starting just after the enactment of CEQA, California's relative population growth accelerated and California continues to grow faster than the rest of the U.S. until the recession of 1990. The recession of 1990 brought California's relatively faster population growth to an end. After 1990, California's population continued to grow but at a rate similar to overall U.S. population growth. As a consequence, California's red growth-in-population-share line bounces around the horizontal dashed line from the early 1990s to the present.[3]

The left-hand axis in Figure 2 refers to the blue line which traces out California's annual share of new houses (measured as new permits for residential housing). This data series begins in 1963 and basically follows the pattern set by changes in California's share of the U.S. population. In short, new residential housing in California followed changes in population in California both before and after the passage of CEQA. There is no evidence here that CEQA hobbled the growth in California residential housing construction.

Manufacturing Output

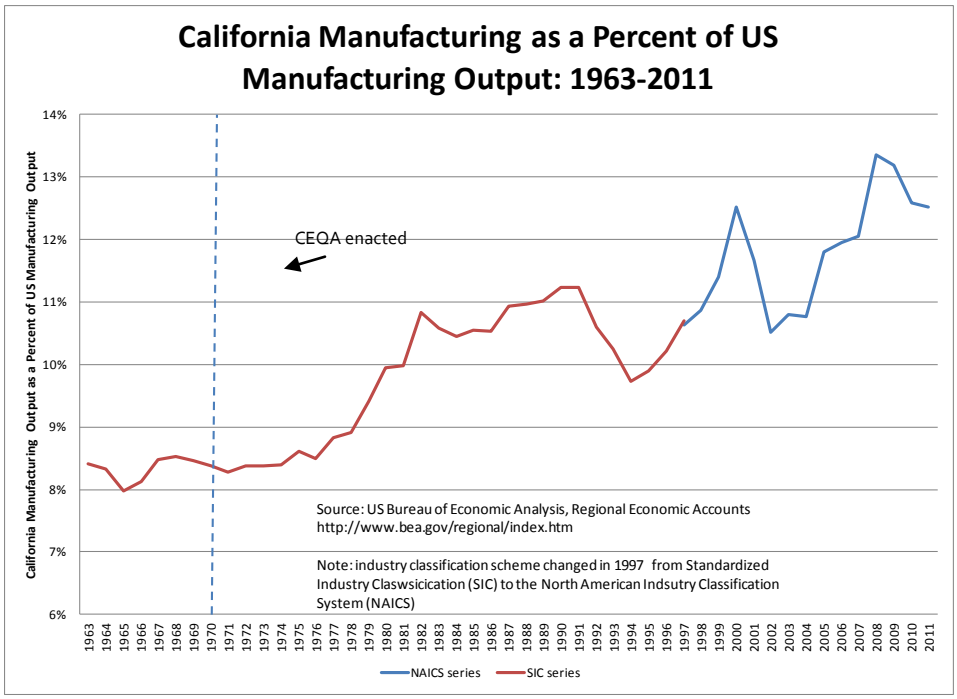

FIGURE 3: CALIFORNIA MANUFACTURING OUTPUT AS A PERCENT OF OVERALL U.S. MANUFACTURING OUTPUT, 1963 TO 2011

[3] Another view of this pattern is shown in footnote iv

Figure 3 shows that for the short period for which we have data prior to the enactment of CEQA, California's share of overall U.S. manufacturing output remained fairly constant. This constant share continued after the enactment of CEQA in 1970 until the late 1970s when California's share of U.S. manufacturing output climbed from about 8.5% to about 11% in the early 1980s. California's share of U.S. manufacturing output declined during the aftermath of the tough recession of 1990, but since the late 1990s, California has again increased its share of U.S. manufacturing.[4] But the Great Recession, California's share of U.S. manufacturing had risen to over 13% but this has fallen to about 12.5% since 2008. There is nothing in this pattern to suggest that CEQA, which most directly affects industrial activities, has in any way hampered or hobbled the development of California manufacturing. Indeed, one could make the plausible argument that by mitigating pollution, CEQA has, over the last 40 years, helped California to attract many of the professional workers that have helped stimulate high tech manufacturing in California. In an alternative world where pollution had continued to worsen the way it did in the 20 years after World War II for the 40 years since 1970, would high tech, biotech and other professionally dependent industries have stayed in an ever worsening California environment? While the data are not available to rigorously test this counterfactual, it is telling that California manufacturing output has prospered subsequent to, and over the entire time period since CEQA's enactment (1970).

Construction Employment

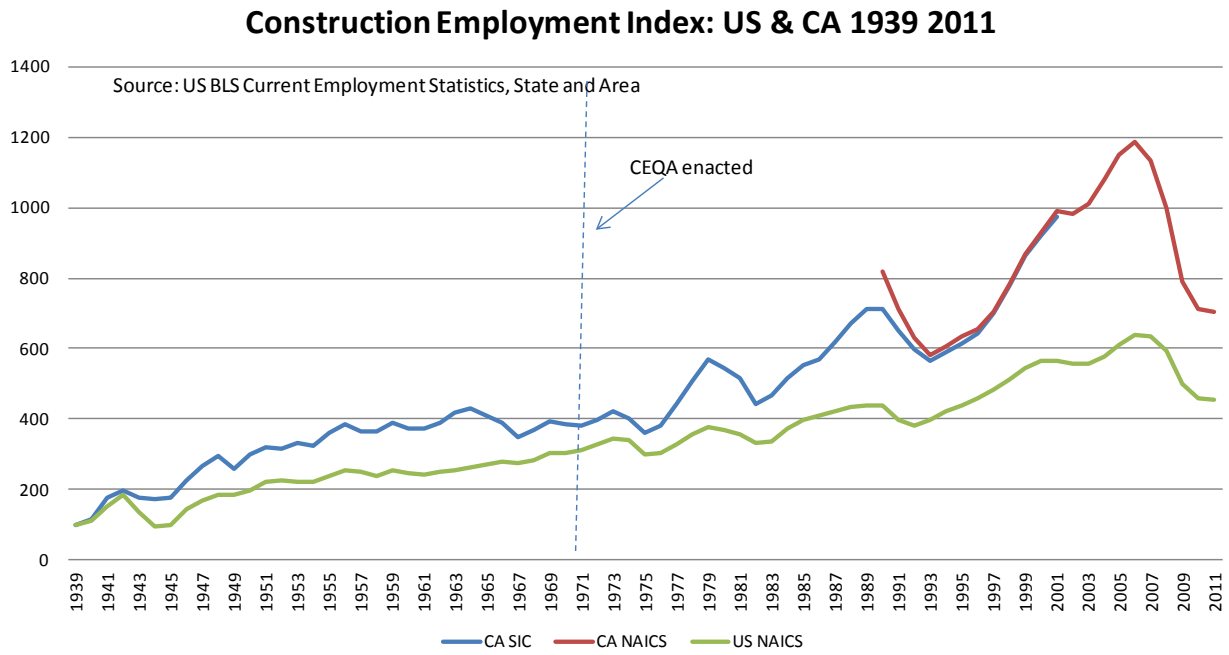

FIGURE 4: INDEX OF THE GROWTH IN CALIFORNIA AND U.S. CONSTRUCTION EMPLOYMENT FROM 1939 TO 2011

Figure 4 provides the first of two looks at the relative growth of California construction since 1939 viewed through the lens of construction employment. The advantage of these data is that they provide a 30-year look at the growth of California construction prior to the enactment of CEQA followed by a 40 year view of California construction employment relative to the U.S. after the passage of CEQA. In Figure 4, construction employment for both California and the overall U.S. is set at an index of 100 in 1939. Starting during World War II California construction employment outpaced U.S. construction

[4] After the passage of the North American Trade Agreement (NAFTA) in 1995, federal statistics began revising its industrial classifications so that a uniform set of data would be gathered by the U.S., Canada and Mexico. This led to a switch from the older Standard Industrial Codes (SIC) to the newer North American Industrial Classification System (NAICS). In the series reported in Figure 3 and some subsequent figures, SIC and NAICS data are combined to create a long term series for comparison. The differences in these series are minor at the level of aggregation we are examining.

employment due first to the growth of war industries within California and then subsequently with the faster growth of California's population compared to the U.S. California's construction advantage continued to expand until the early 1960s. From the early 1960s to the mid-1970s, California construction lagged U.S. construction growth. But with the middle 1970s forward, California's construction advantage relative to the overall U.S. expanded measurably and markedly until the Great Recession. The last four years, 2008-11 have hit California construction much harder than the rest of the U.S. although the advantage today is still greater than it was prior to the passage of CEQA. Again, there is no evidence in these data that CEQA has in any measurable way hampered or hobbled construction in California.

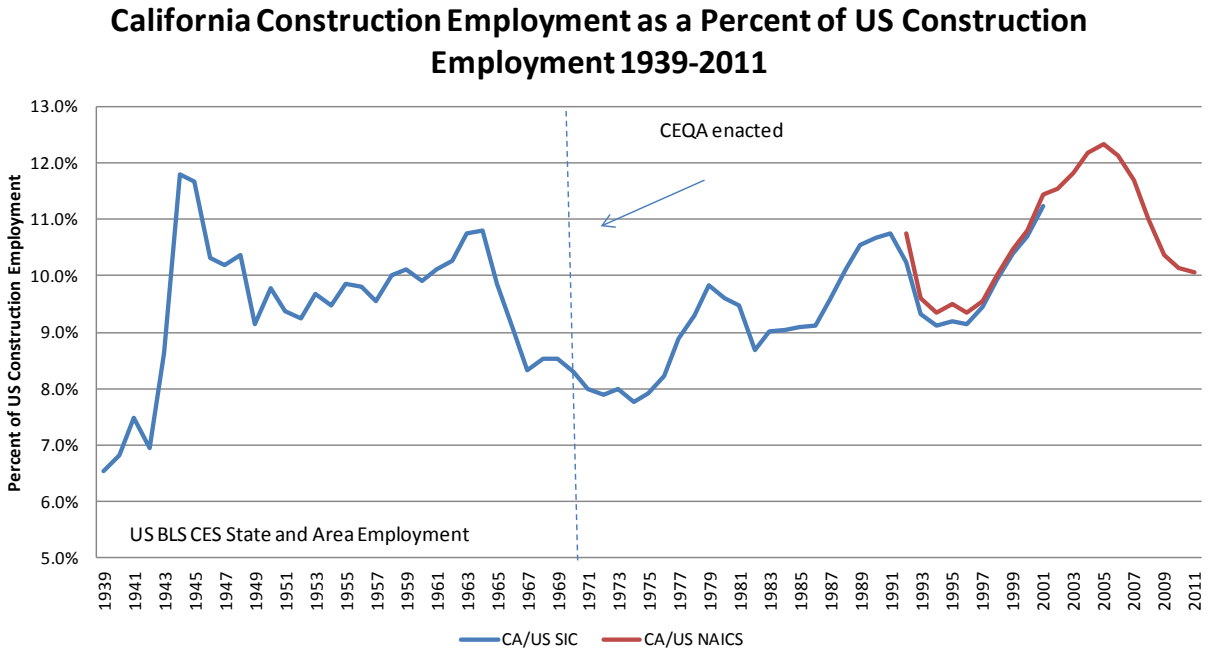

FIGURE 5: CALIFORNIA'S SHARE OF OVERALL U.S. CONSTRUCTION EMPLOYMENT, 1939 TO 2011

In Figure 5, we take a second look at California construction: this time we examine California construction employment as a percent of overall U.S. construction employment from 1939 to 2011. We see that with the start-up of World War II, California's share of overall U.S. construction rose dramatically associated with war production and the building of related industrial facilities and worker housing. The post-war period saw a step back from the wartime highs, but California still had around 10% of all construction jobs until the early 1960s when building tapered off. California's share of U.S. construction jobs fell to around 8% when CEQA was enacted and remained around 8% until after the recession of 1973. From the mid 1970s onward, California's share of overall U.S. construction jobs grew driven by both growth in manufacturing, overall economic growth in California and growth in housing. By 2006, California had a greater share of all U.S. construction jobs than even during the World War II boom. The Great Recession put an end to this primarily residential boom in construction. But even in the depth of the Great Recession when California's residential construction was at a standstill, California had a greater share of overall U.S. construction than in 1970 when CEQA was enacted. Indeed, California's share of construction jobs at the bottom of the Great Recession matched California's share of construction jobs during the heyday of the post-war baby boom in California. Again, there is no evidence in these aggregate data that CEQA in any way hampered, hobbled, held up or delayed California economic development, in general, or California construction, housing construction or manufacturing construction, in particular.

Summarizing CEQA's Impact on the California Economy

Looking at basic measures of California economic development, per capita GDP, residential housing compared to population, manufacturing output and construction employment, and benchmarking these measures against overall U.S. performance, there is no evidence that CEQA has hampered, hobbled, restrained or hurt California's economy. Indeed, quite the reverse may be true. California's well known comparative advantage in high tech, biotech and other professional and research-related industries has been attributed to the state's excellent colleges and universities, the emergence of concentrated areas where multiple firms engage in similar and related activities often adjacent to university campuses and near sources of venture capital. But cannot a cleaner environment also take some credit for these centers of economic excellence? Studies have shown that quality of life is an important consideration in business relocation especially for businesses that employ a high proportion of professionals or perceive the ability to attract and retain professional labor is a primary concern.[v] CEQA, as an integral part of the way California manages its environment better, may well have played a role in the long run robust pattern of California economic growth.

Critics of CEQA may wish to respond to this aggregate evidence that CEQA has had no overall negative impact on California economic development by quoting former Defense Secretary Donald Rumsfeld who famously stated with regards to weapons of mass destruction in Iraq: "the absence of evidence is not evidence of absence."[5] And indeed, failure to find any overall, measurable and meaningful negative effect on California's economic growth from the enactment of CEQA does not necessarily mean that such an effect in some smaller way may yet still be there. But these data indicate that whatever negative effect CEQA may have had on California economic development, it has not been sufficiently large as to show up clearly in overall measures of California's economic development or manufacturing and construction activity.

Secretary Rumsfeld's famous aphorism holds another lesson: the absence of evidence is not evidence that something actually is there. The absence of any evidence that CEQA has hampered or hobbled overall California economic development or manufacturing output or construction activity obliges CEQA critics to find such evidence. It is not enough to believe it is there. And it is not enough to tell anecdotal war stories suggesting such evidence might be there. Faith and war stories led Secretary Rumsfeld astray and reliance on that kind of "evidence" poses the same risks for CEQA critics.

CEQA and California's Environment

Overview

In 2010, California's electrical generation was much cleaner than that of the rest of the U.S. taken as a group. Looking at the three basic measures of smokestack pollution, 1) carbon dioxide (CO_2), 2) sulfur dioxide (SO_2) and 3) nitrogen oxides (NOX), Table 1 shows that in 2010, electrical generation in the rest of the U.S. emitted 3 times the amount of carbon dioxide per megawatt of generating capacity compared to California. Similarly, the rest of the U.S. emitted almost twice the amount of nitrogen oxide and dioxide per megawatt of capacity compared to California; and the rest of the U.S. emitted 136 times the amount of sulfur dioxide per megawatt compared to California.

[5] "Q: Regarding terrorism and weapons of mass destruction, you said something to the effect that the real situation is worse than the facts show. I wonder if you could tell us what is worse than is generally understood.
Rumsfeld: Sure. All of us in this business read intelligence information. And we read it daily and we think about it and it becomes, in our minds, essentially what exists. And that's wrong. It is not what exists....[T]he absence of evidence is not evidence of absence. It is basically saying the same thing in a different way. Simply because you do not have evidence that something exists does not mean that you have evidence that it doesn't exist." U.S. Department of Defense, Office of the Assistant Secretary of Defense (Public Affairs)
News Transcript, Secretary Rumsfeld Press Conference at NATO Headquarters, Brussels, Belgium, June 06, 2002
http://www.defense.gov/transcripts/transcript.aspx?transcriptid=3490 (accessed January 25, 2013).

The primary reason California's electrical generation was cleaner than the rest of the U.S. in 2010 is because California's mix of fuels in generating electricity was inherently cleaner than the fuel mix that generated electricity in the rest of the U.S. Figure 9 shows that the rest of the U.S. in 2010 relied more on coal and more on petroleum and less on natural gas and less on water-power for generating electricity than did California. Water power does not emit meaningful amounts of air-born pollutants while natural gas is cleaner than either coal or oil. But even when coal and hydroelectric generation are excluded, Table 1 shows that the rest of the U.S. electrical generation still emitted twice the CO_2 per megawatt of generating capacity; the U.S. emitted almost 1.5 times the amount of NOX per megawatt, and the U.S. emitted 124 times the amount of SO_2 per megawatt, all compared to California. Thus, even setting aside coal, which California has not used in significant amounts since at least 1970, and setting aside hydroelectricity, in which California has a natural advantage, California's electrical generation in 2010 was substantially cleaner than the rest of the U.S.

We do not know what the relative pollution levels were for California compared to the rest of the U.S. in 1970, the year CEQA was enacted. We do know that in 1970, California utilities had a very different structure of fuel usage compared to the rest of the United States. In particular, California utilities did not use significant amounts of coal in generating electricity while the rest of the U.S. relied upon coal for almost half of all electrical generation. (See Figure 6) We will see in the first case study below that both Pacific Gas & Electric and Southern California Edison would propose large coal-fired power plants in the late 1970s but due to CEQA opposition and adverse economic conditions, these plants never were built.

We will also see, below, that over the four decades since 1970, the rest of the U.S. reduced its reliance upon coal, particularly after 1990. Both the rest of the U.S. and California expanded their reliance upon natural gas with California going in this direction sooner and further. In a sign that regulations were moving California in a new direction, we will also see that California first moved towards natural gas before 1990. This is significant because economic conditions were pushing against this switch towards natural gas because natural-gas prices were rising relative to alternative fuels (coal and oil) throughout the 1970 to 1990 period. The rest of the nation, for the most part, followed market incentives in using natural gas only after natural gas prices started to fall relative to alternative fuel-oil and coal prices. By 1990, California was also leading the way in the use of pumped storage, geothermal and wind as alternative energy sources for generating electricity. The first case study below will show a connection between the abandonment of proposed coal-fired power plants in California and the development of these alternative and in most cases renewable energy facilities. By 2010, the rest of the U.S. had not yet followed suit in the pursuit of these cleaner alternatives.

We will argue below that the distinct evolution of California's cleaner fuel mix in generating electricity is due, in part, to CEQA procedures in combination with the rules and decisions of lead and responsible agencies. While differential proximity to different fuel sources and the relative prices of fuel sources have both played a role in the cleaner mix of California fuels compared to the rest of the U.S., we will show that the CEQA process and related California environmental rule requirements have had a meaningful impact on the choice of cleaner fuels in California compared to fuels chosen to generate electricity elsewhere in the U.S. over the last 40 years. We will also show that these CEQA processes have not stymied the development of electrical generation in California with the expansion of California electrical generation capacity matching the growth in U.S. electrical generation over the last decade since 2000. Furthermore, we will show that in the current case of utility-scale solar electrical generating facilities, CEQA has not hampered the recent rapid growth of this energy source either in California.

TABLE 1: METRIC TONS OF POLLUTION PER MEGAWATT OF CAPACITY IN ELECTRICITY GENERATION, U.S. AND CALIFORNIA, 2010[vi]

2010		All Fuel Sources		All Fuel Sources except Coal & Hydroelectric	
		U.S.	CA	U.S.	CA
	Megawatt Capacity	2,277,275	145,141	1,856,775	134,672
Metric Tons per Megawatt	CO2	2,098	763	1,564	797
	SO2	4.74	0.03	3.15	0.03
	NOX	2.19	1.10	1.69	1.16
Ratio of U.S. to CA	CO2	3		2	
	SO2	136		124	
	NOX	1.99		1.46	

Changes in Fuel Mix since 1970

The 1970 U.S. and California Fuel Mix

In 1970, California, a state with fairly abundant oil resources compared to many states was four times more reliant upon oil to fuel its electricity generators compared to all other states taken together. (Figure 6)[6] California was about half-again more reliant upon hydroelectric power and half-again more reliant upon natural gas compared to the use of these energy sources in generating electricity in all other states. California was not using significant amounts of coal to generate electricity when CEQA was passed while other states as a group relied more upon coal than any other single fuel source. These differences in 1970 prior to the passage of CEQA and the National Environmental Policy Act (NEPA) were driven primarily by differential resource availability across states and the relative prices of competing fuels. But with the passage of CEQA, things were about to change in California. In addition to prices and geography, regulation was to play an important, additional role in how electricity was going to be generated in California while in the rest of the U.S. things were not to change very much for at least 20 more years. But before we analyze the evolving fuel mix for California electrical generation, we must notice that in the case of nuclear power, the Warren Alquist Act of 1976 grandfathered already licensed nuclear power plants that were under construction but effectively stopped further nuclear power development. As these grandfathered nuclear plants came on line, generating capacity from nuclear power would grow. But this was really an echo of licensing prior to 1976.

[6] "Nameplate capacity, also known as the rated capacity, nominal capacity, installed capacity or maximum effect, refers to the intended technical full–load sustained output of a facility such as a power plant…" Wikipedia, "Nameplate Capacity," http://en.wikipedia.org/wiki/Nameplate_capacity (accessed January 27, 2013)

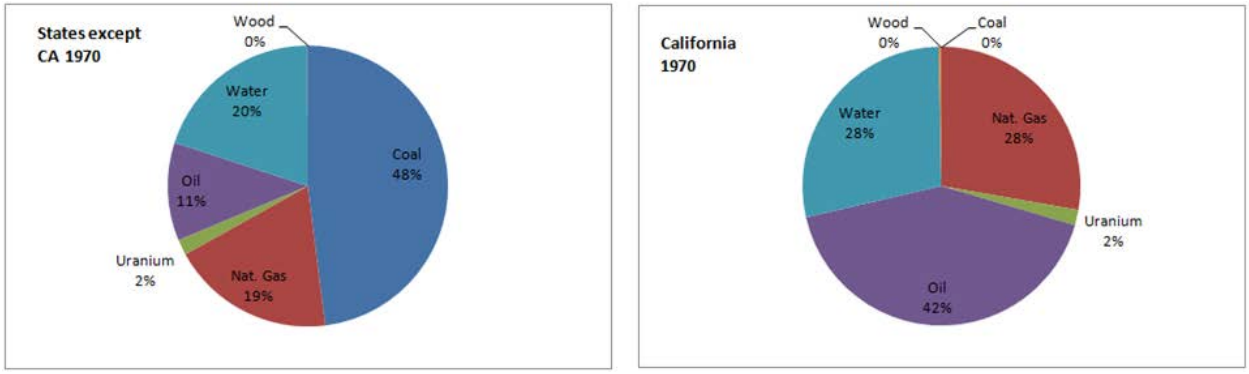

FIGURE 6: DISTRIBUTION OF ELECTRICAL NAMEPLATE GENERATION CAPACITY BY PRIMARY FUEL SOURCE, U.S. (EXCEPT CALIFORNIA) AND CALIFORNIA, 1970 [vii]

CEQA was passed in 1970 and the California Energy Commission (CEC) was created in 1974. The CEC would be responsible for licensing larger power plants with 50 megawatts or more of generating capacity. CEQA would be the framework for the CEC to involve the public in project licensing.[viii] In 1976, the Warren Alquist Act which created the CEC was amended to require the CEC, prior to licensing any new nuclear power plant, to certify that any spent fuel rods from that plant could be stored in a federally approved high level nuclear waste disposal site.[ix] Diablo Canyon nuclear power plant which began construction in 1968, began commercial operation only in 1984.[x] San Onofre Nuclear Generating Station began construction in 1964 but units two and three were not commissioned until 1983 and 1984 respectively.[xi] These two plants were grandfathered and allowed to be commissioned while the 913 MW Rancho Seco nuclear power plant came into operation in 1975 before the Warren Alquist amendment, going out of operation in 1989.[xii] So the flow and ebb of nuclear power in California was basically set by the 1976 Warren Alquist amendment. Thus, while the public played a key role in the evolution of nuclear power in California, that role was not play through CEQA.

The 1990 U.S. and California Fuel Mix

Moving forward 20 years to 1990, despite the coincident passage in 1970 of the National Environmental Policy Act (NEPA—1970) at the federal level,[xiii] relative fuel usage in generating electricity had not changed all that much for utilities outside California over these two decades. (Compare Figure 6 with Figure 7.) For instance, coal, which outside of California accounted for 48% of electrical utilities' primary fuel in 1970, accounted for a similar 45% of their fuel for generating electricity in 1990. (To see this, compare non-California data in Figure 6 with these same 49 states in Figure 7.) Also, fuel-oil, which accounted for 11% of non-California electrical generating capacity in 1970 continued to account for a same 11% in 1990. And again, natural gas, which accounted for 19% of electrical generation outside of California in 1970, accounted for a similar 17% in 1990. So for the Big Three fuels in generating electricity, outside of California, little had changed in the first 20 years of CEQA and NEPA.

Water power did fall as a share of overall electrical generating capacity outside of California from 20% in 1970 to 9% in 1990. There is a natural limit to the availability of sites for large hydroelectric generation. So with hydroelectricity roughly fixed by 1970, growth in overall electrical generating capacity nationwide, inevitably drove down hydroelectricity's share of overall electrical generation.

This relative fall in hydroelectricity was approximately offset by a rise in nuclear power generation over this same period from 2% in 1970 to 14% of electrical generating capacity outside of California in 1990. Thus for the mainstays of fuels for generating electricity—oil, natural gas and coal—outside of California, there were minor changes in the relative

importance of these three fuels while water power receded in relative importance and nuclear power increased its relative share.

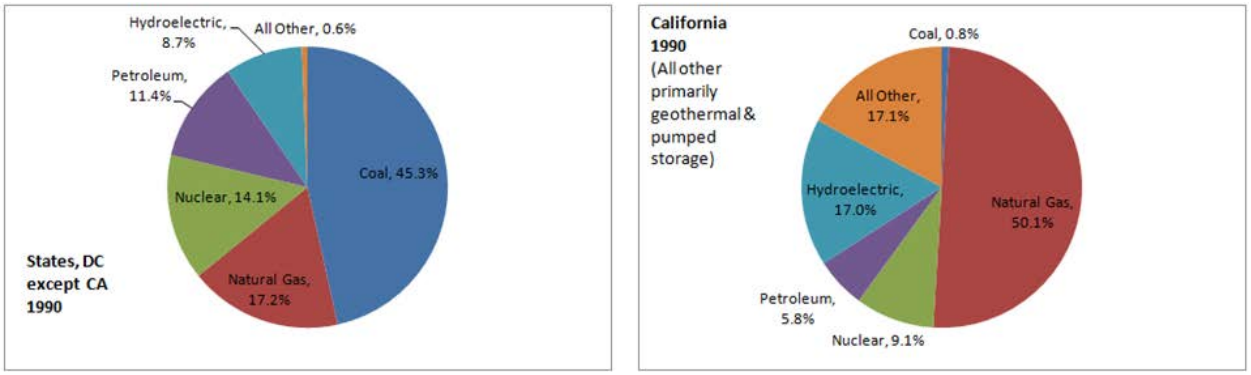

FIGURE 7: DISTRIBUTION OF ELECTRICAL NAMEPLATE GENERATION CAPACITY BY PRIMARY FUEL SOURCE, U.S. (EXCEPT CALIFORNIA) AND CALIFORNIA, 1990[xiv]

Relative Fuel Prices

It is not surprising that nationally, between 1970 and 1990, natural gas did not play an increasing role in the fueling of electrical generation. Figure 8 shows that the price of natural gas relative to fuel-oil and coal was rising throughout the period 1970 to 1990.[7] Thus, during this period, economic pressures were leading, if anything, towards less reliance upon natural gas rather than more.

[7] In an unsuccessful attempt to slow the relative rise in natural gas prices, Congress enacted the Natural Gas Policy Act of 1978. This act partially lifted natural gas price controls, allowing natural gas prices to rise and leading to a dampening of natural gas demand. "The Natural Gas Policy Act took the first steps towards deregulating the natural gas market, by instituting a scheme for the gradual removal of price ceilings at the wellhead. However, there still existed significant regulations regarding the sale of gas from an interstate pipeline to local utilities and local distribution companies (LDCs)." Subsequently, in 1989 Congress passed the National Gas Wellhead Decontrol Act which by 1993 led to the complete deregulation of natural gas wellhead prices. "The History of Regulation," NaturalGas.org, http://www.naturalgas.org/regulation/history.asp#gasact1978 (accessed January 15, 2013)

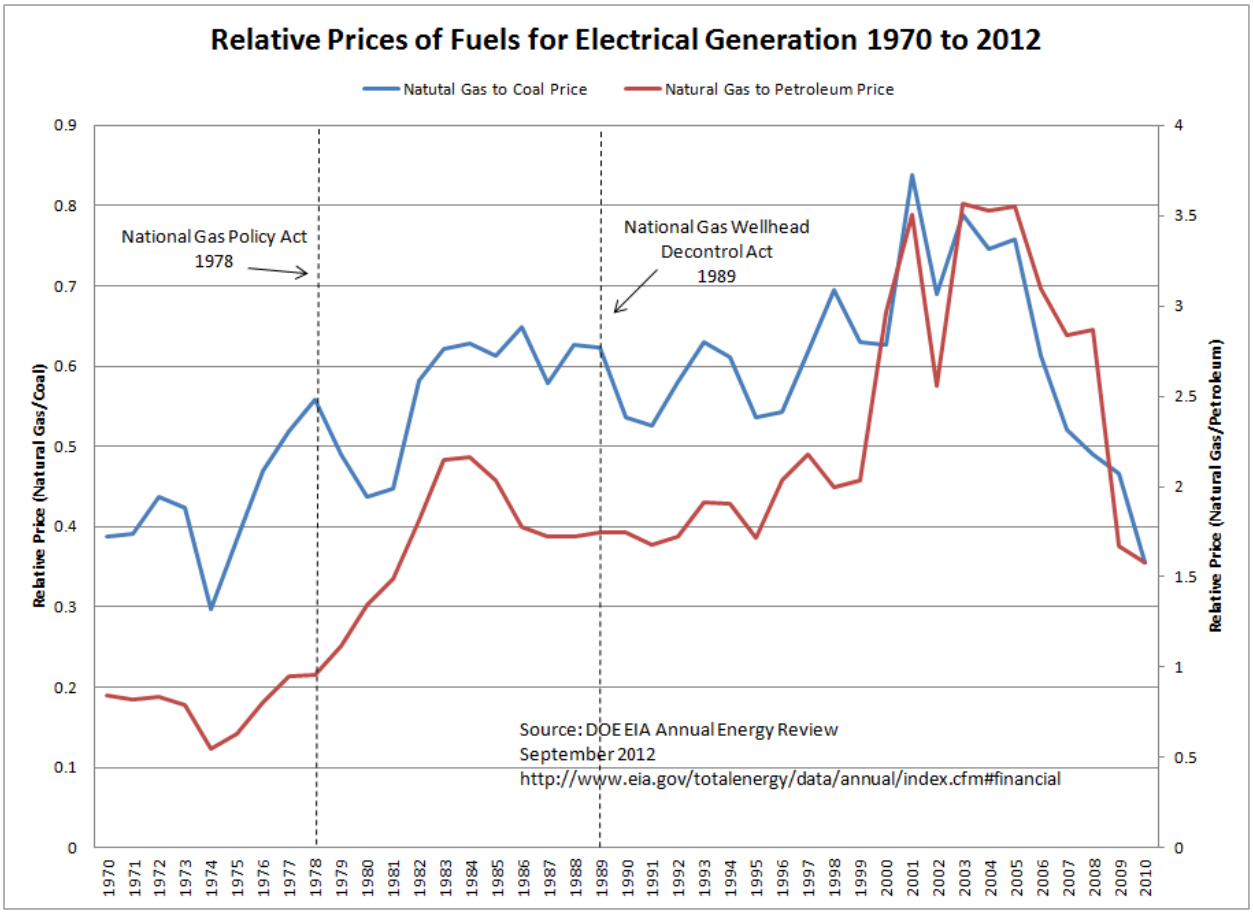

FIGURE 8: RELATIVE PRICE OF NATURAL GAS TO OTHER FUELS (COAL AND PETROLEUM)[xv]

What is surprising, from the perspective of economic pressures alone, is that after the passage of CEQA in 1970, California switched dramatically away from an increasingly relatively cheaper fuel—oil—towards an increasingly relatively more expensive fuel—natural gas. (Compare Figure 6 and Figure 7 for California.) Some of this switch may have been related to California's geographic advantages in natural gas. California electrical generators may have wanted greater security in fuel supplies by turning to a local, albeit, increasingly expensive fuel after the oil shock of 1973 made the steady flow of international oil seem more doubtful.[xvi] However, with price pressures pushing in the opposite direction and oil prices actually falling relative to natural gas after 1973, CEQA decisions in combination with the related complex of California environmental regulations appear to have played an important additional independent role in moving electrical generation in California towards natural gas between 1970 and 1990. Certainly, the rest of the country was preserving the status quo in the use of fuel-oil vs. natural gas. (Again see Figure 6 and Figure 7.)

The contrast between California and the rest of the nation in fueling electrical generation after the passage of CEQA are dramatic. While coal stayed negligible as a fuel source in California between 1970 and 1990, it was not for the lack of large coal-fired power plant proposals from PG&E and Southern California Edison. A case study of this below shows that CEQA played a role in stifling these coal-plant proposals and stimulating a shift towards renewable energy generation. Also, in California, in spite of fuel-oil's increasingly attractive price relative to natural gas, fuel-oil dropped from 42% of generating capacity to 6% in California over the 20 years, 1970 to 1990. As noted above, in a significant change in the other direction, natural gas electrical generation rose from 28% to 50% of all California generation capacity over this period 1970 to 1990.

California CEQA processes and environmental regulations pushed against market forces to help drive this switch in fuels from oil, a greater source of environmental pollution to natural gas, a lesser source of environmental pollution.[xvii]

Because of the dynamic changes in California fuel usage for generating electricity, and the relative stability in fuel sourcing elsewhere, by 1990, the fuel used in the generation of California electricity differed considerably from that of the rest of the United States. In simplest terms, California had become a natural gas user (instead of fuel-oil) while the rest of the country continued to rely upon coal; and, in relative terms, the rest of the U.S. had not increased its use of natural gas by 1990.

In comparing fuel usage in 1990, Figure 7 shows that for states other than California, coal remained the most important fuel source for electricity generation (45%) while in California coal was still a negligible source of electricity generation. While natural gas accounted for 17% of the U.S. electrical generation, in California in 1990, natural gas accounted for half of all California electrical generation capacity. California had twice the hydroelectric capacity compared to the U.S. while geothermal and pumped storage accounted for almost 17% of California's electrical generation capacity. Geothermal and pumped storage were a negligible part of U.S. generation capacity. Thus, in 1990, California's electrical generation was inherently cleaner in terms of air pollution compared to the rest of the U.S. with the exception that the U.S. used a larger share of nuclear power (14.1%) compared to California (9.1%). This movement to cleaner fuels for electrical generation in California since 1970 can, to some extent, be attributed to the effects of CEQA. After discussing the changes from 1990 to 2010, we will estimate the relative importance of CEQA in making this switch to natural gas.

2010 U.S. and California Fuel Mix

Figure 9 shows that over the 20 years from 1990 to 2010, nationally, coal has dropped in relative importance from fueling 45% of electrical generation capacity to 32%. Nationally, fuel-oil has fallen from about 11% to about 6%. Nationally, natural gas has jumped from fueling 17% of electrical generation capacity to almost 40% from 1990 to 2010. Falling natural gas prices relative to fuel-oil and coal after 2001 have very likely played a role in the national increase in the importance of natural gas in fueling electricity generation. In California, while coal still remains a negligible source fueling California's electricity, natural gas has gone from fueling 50% to almost 63% of California's electrical generation capacity over the period 1990 to 2010. Probably falling natural gas prices relative to fuel-oil after 2001 (Figure 8) have played a role along with CEQA and environmental regulations in the continued increasing relative importance of natural gas in California electrical generation. Nuclear, petroleum and hydroelectric generation have each fallen in relative importance in California while "all other sources" in Figure 7 and Figure 9 (primarily pumped storage, geothermal and wind in that order) have roughly retained their relative importance in fueling California's electrical generation between 1990 and 2010. Thus, California has continued its switch away from fuel oil towards natural gas over a 30-year period 1970 to 2000 when the relative price of natural gas was pushing in the opposite direction and over the 10-year period 2001-2010 when the relative price of natural gas was reinforcing this change.[xviii]

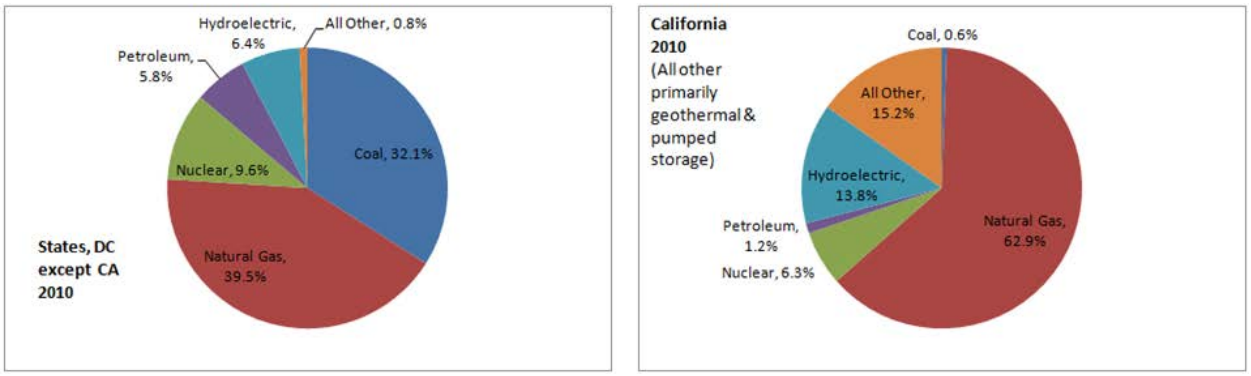

FIGURE 9: DISTRIBUTION OF ELECTRICAL NAMEPLATE GENERATION CAPACITY BY PRIMARY FUEL SOURCE, U.S. (EXCEPT CALIFORNIA) AND CALIFORNIA, 2010[xix]

Summarizing the Change in Fuel Mix 1970-2010

Figure 10 summarizes the changes in electrical generation fuel usage from over the 40 years from 1970 to 2010 for the 49 states other than California (left three bars) and California (right three bars).

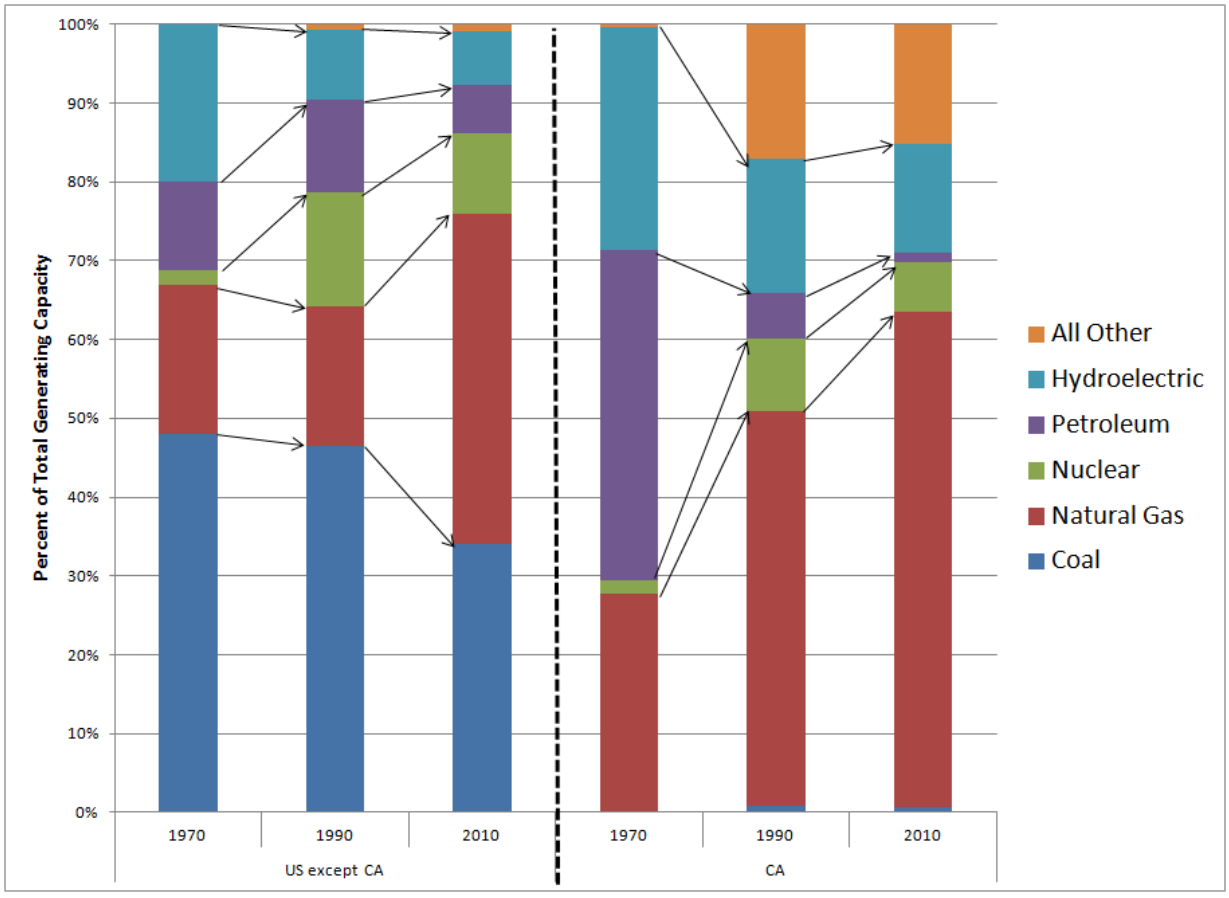

FIGURE 10: RELATIVE USE OF COMPETING FUELS IN GENERATING ELECTRICITY, U.S. EXCLUDING CALIFORNIA AND CALIFORNIA: 1970, 1990 AND 2010[xx]

Figure 10 recapitulates Figure 6, Figure 7 and Figure 9 allowing an overview of national and California fuel mix changes over a 40 year period. While coal declines for the U.S., it was a negligible fuel in California. While California began switching to natural gas by 1990, the U.S. switch comes later and does not go as far. Reliance upon nuclear energy grew in both the U.S. and California in the first 20 years. This growth in California reflected the licensing of nuclear power plants in the 1960s which came on line in the 1970 to 1990 period and this growth had stabilized in the second 1990 to 2010 period. In the last 20 years, California has expanded its already greater reliance upon natural gas in tandem with a national expansion in the relative importance of this fuel. In the 1980s with the ending of coal as a viable option in California, state utilities began leading the way towards renewable and other non-traditional energy sources. In the last 20 years, California continued to be out in front by sourcing relatively more electrical generation from geothermal, wind and pumped storage energy source while as of 2010, these energy sources remained negligible in the rest of the U.S. taken as a group. Not shown in Figure 10 but discussed below, since the early 2000's, California has set a goal for utility companies to source 33% of their electrical generation from renewable sources. This initiative has led to a rapid expansion and proposed expansion of solar and other renewable electrical generation projects but most were not online by 2010 when these data were collected.

CEQA's Role in Shaping Electrical Generation

Relative Prices and Regulation

Oil, natural gas and coal are alternative fuels in the generation of electricity. As Figure 8 shows, over the long-run from 1970 to 2000, natural gas prices paid by industrial uses including electrical utilities, generally rose relative to the price of fuel oil and coal until the turn of the century. If relative prices were driving California's fuel mix for power generation, natural gas would had a constant or falling share in powering California electricity. Instead, California's laws regulations pushed the state's fuel mix towards natural gas and alternative energy sources between 1970 and 1990. The first case study below describes CEQA's role in discouraging the building of proposed large coal-fired power plants in California in the late 1970's. Pacific Gas & Electric (PG&E) and Southern California Edison (SCE) were perhaps proposing big coal plants in response to the effective prohibition against further nuclear plants. In any case, this case study shows how faced with opposition to proposed coal plants, opposition expressed in part through CEQA hearings, PG&E and SCE switched course dropping further proposals of coal plants and instead promoting alternative energy sources for generating electricity. So this case study helps us understand not only the 1970-1990 rise in natural gas electrical generation but also the relative expansion of "other" energy generation sources over those 20 years.

Natural gas prices have been falling relative to coal and oil since around 2000. While natural gas prices were rising during the 1990s, California deregulated its electrical utility industry in ways that led both to the California electrical black-out crisis of 2000-2001 and the coincident and subsequent building boom in California power-plants starting in the late 1990s. In 1996, California passed AB 1890, The Electric Utility Industry Restructuring Act. We cannot pause here to consider whether this act caused or contributed to the electricity black-out crisis of 2000-2001. What is important for our consideration is that this utility restructuring eventually led to an electrical generation building boom that was to a significant extent a building boom in natural gas electrical generating facilities.[xxi]

Figure 11 compares the growth of nameplate electrical generation capacity in the U.S. to California from 1990 to 2011. During the 1990s compared to after 2000, U.S. nameplate capacity grew slowly (11.6% over 11 years) while California nameplate capacity grew not at all. Subsequent to AB 1890 which passed in 1996, proposed construction in California geared up and started to come online around 2001. Since 2000, U.S. operational nameplate capacity has grown by 32.9% and California's electrical generation capacity has grown by 34.5%.[xxii] This suggests that CEQA does not slow the growth

of electrical generating capacity, and we now consider this issue from the perspective of project cancellations comparing California to other states.

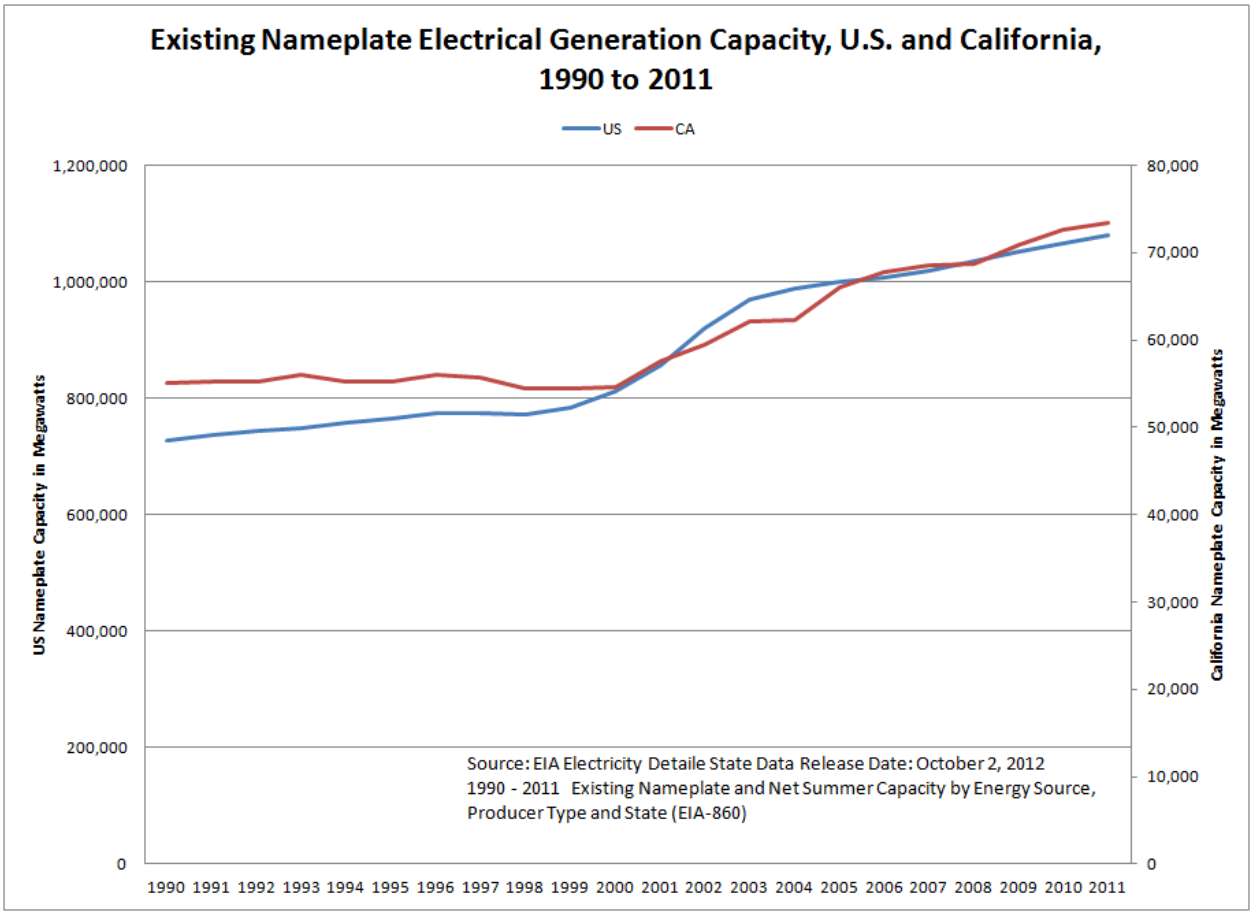

FIGURE 11: GROWTH IN NAMEPLATE ELECTRICAL GENERATION CAPACITY IN THE U.S. AND CALIFORNIA, 1990 TO 2010

CEQA's Effect on the Cancellation of Projects

Regardless of the environmental benefits conferred in part by CEQA reflected in cleaner thermal power plant fuels and the development of alternative energy sources, concern is expressed that CEQA unnecessarily postpones or cancels prospective projects and hampers economic development. This criticism is typically supported by describing a particular project or projects that were delayed or cancelled associated with a CEQA review. This approach fails to consider that building projects are often delayed or cancelled for reasons other than environmental review and also that many projects are delayed and cancelled in jurisdiction outside of CEQA's coverage precisely for environmental reasons. The appropriate question to ask is whether CEQA leads to more postponements or cancellations compared to other environmental regulatory regimes?

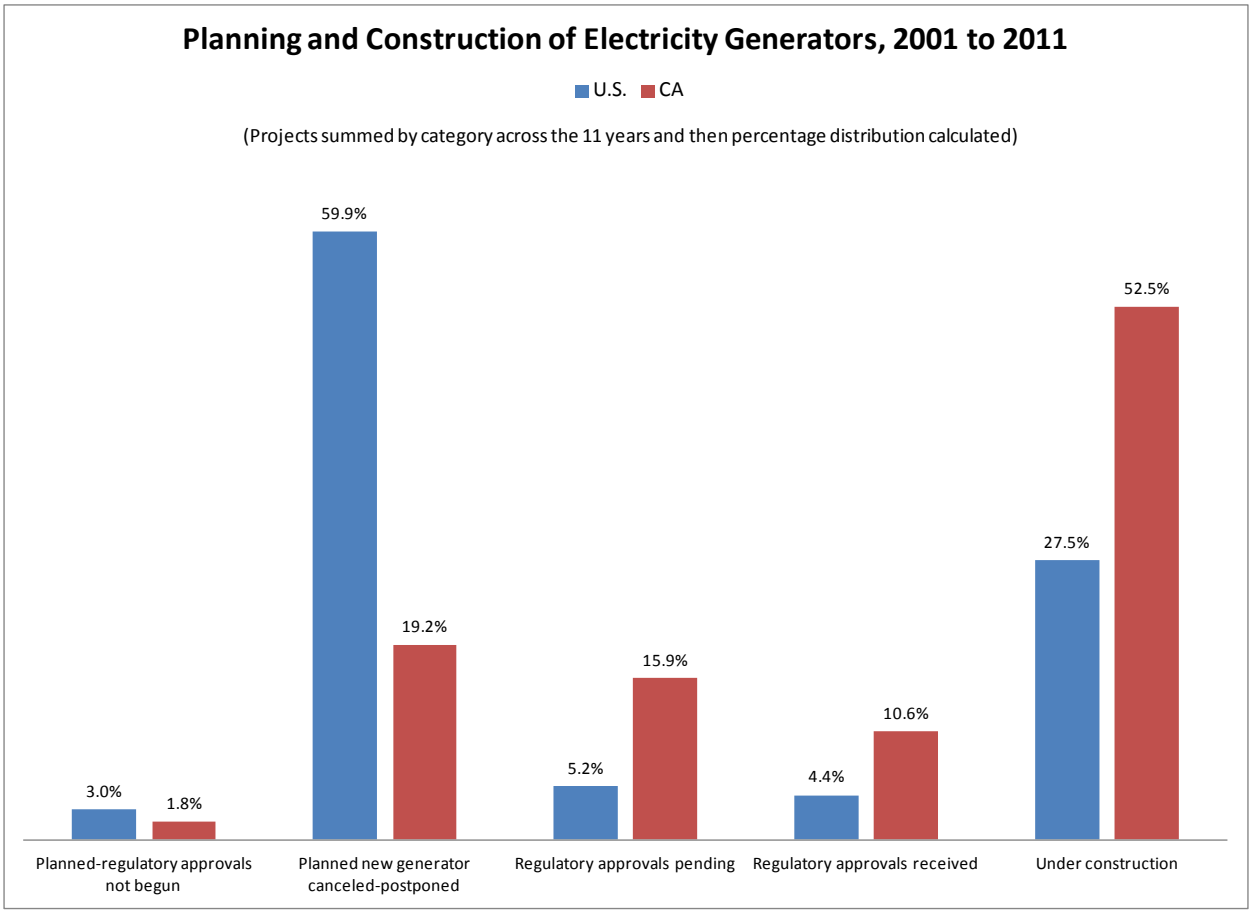

FIGURE 12: THE DISTRIBUTION OF PLANNED, APPROVED, CANCELLED AND UNDER-CONSTRUCTION ELECTRICAL GENERATION PROJECTS, THE REST OF THE U.S. AND CALIFORNIA, 2001-2011[xxiii]

Figure 12 indicates that over the last 11 years, electrical generation projects within CEQA's purview have been postponed or cancelled less often than similar electrical generation projects in other states and consequently under the purview of other, non-CEQA, environmental procedures and regulations.

In California, of all the electrical generation projects that were a) planned, or b) sought regulatory approval, or c) received regulatory approval, or d) began construction or alternatively e) were cancelled or indefinitely postponed, over the period 2001 to 2011, 19% were cancelled or indefinitely postponed. Eighty-one percent went ahead. The 19% cancelled could have been stopped for environmental or economic or technical or other reasons.

In the rest of the U.S., of all projects that were planned, or sought regulatory approval, or received regulatory approval, and/or began construction or alternatively were cancelled over the period 2001 to 2011, almost 60% were cancelled. Only 40% went ahead as envisioned. In short, postponement and cancellation of electrical generation projects occurred three times more outside of California and CEQA oversight compared to in California and within CEQA's oversight. The reason for these differences remains to be explained. It may be that outside California where environmental regulations are less clearly binding, projects are put on the planning board with less initial environmental consideration only to be cancelled as environmental problems emerge. Not all projects, of course, either inside or outside of California were cancelled for environmental reasons. Other possible reasons for cancellation or indefinite postponement include financial problems, altered expectations regarding electricity demand or revised load forecasts, delay or cancellation of associated facilities, late delivery of equipment, equipment failure, or other reasons.

But there is little reason to believe that these other reasons are pervasive in the rest of the United States and absent from California. If anything, the reverse would be true during this decade because California was hit harder by the Great Recession compared to the U.S. in general.[xxiv] Growth rates in electrical generation capacity were similar in California and the rest of the U.S. in the decade of the 2000s suggesting that cancellation for economic reasons should have been similar. (See Figure 11.)

Consequently, the implication of Figure 12 is that despite local criticisms of CEQA as a law that leads to delayed and cancelled projects, in fact, at least over the last 11 years, CEQA has been substantially less of a barrier to the construction of electrical generation facilities compared to environmental procedures and regulations in the rest of the United States. Indeed, by the end of 2011, almost 53% of California electrical generation projects that had been planned over the period 2001 to 2011 were under construction as opposed to about 28% of the planned projects in the rest of the United States.

Thus far, we have shown that CEQA makes it more probable that the electrical generators built in California compared to the rest of the U.S. are environmentally cleaner and come on line more reliably with fewer postponements and cancellations compared to the rest of the U.S. We now turn to the question of environmental and construction progress under CEQA in building utility-scale solar electrical generating facilities.

CEQA and the Solar Boom

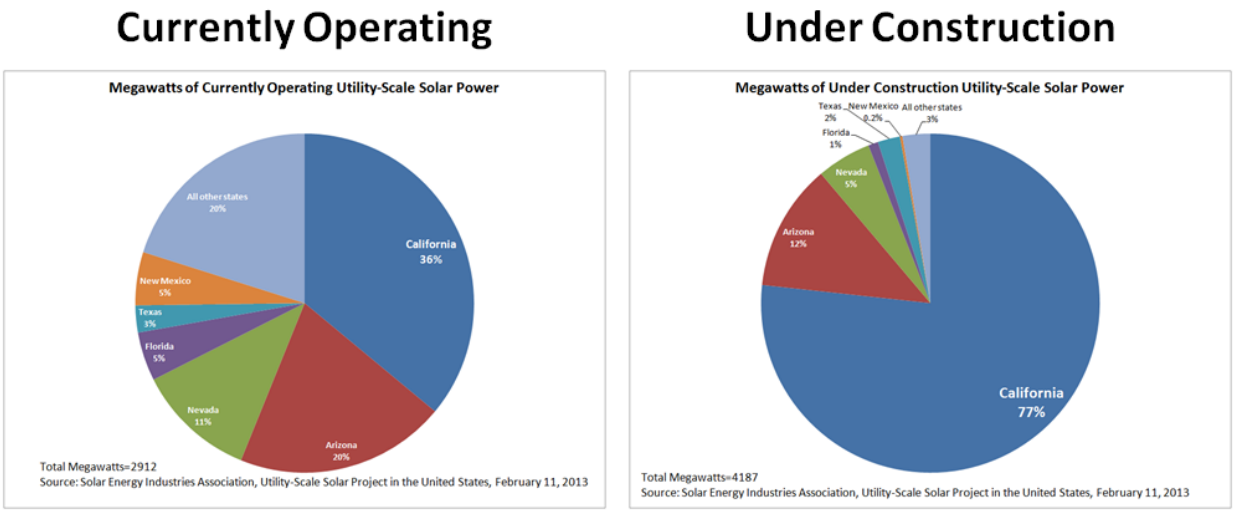

FIGURE 13: PERCENT DISTRIBUTION OF MEGAWATTS OF UTILITY-SCALE, SOLAR ELECTRICAL GENERATING CAPACITY CURRENTLY OPERATING AND UNDER CONSTRUCTION, CALIFORNIA AND SELECTED STATES, 2013[xxv]

Much of the current expansion of electrical generating power is coming from solar power due to the California Renewable Portfolio Standard created by Senate Bill 1078 (2002) and amended by Senate Bill 107 in 2006 and again by SBx1 2 in 2011. These bills and an executive order by Governor Schwarzenegger in 2008 require that electrical utilities, electric service providers, and community choice aggregators expand their renewable sources of energy generation reaching 20% by 2010 and 33% by 2020. By 2012, PG&E, SCE and San Diego Gas and Electric have reached or come close to the 20% 2010 goal.[xxvi] These projects are often licensed by local agencies rather that the California Energy Commission either because they do not involve steam or they are under 50 MW. But these projects must go through a CEQA process regarding their potential environmental impacts. While we do not have data on how many of these projects, if any, failed due to CEQA, Figure 13 shows that California accounts for 36% of all utility-scale solar megawatt capacity and 77% of all utility-scale solar

megawatt capacity under construction. Figure 14 shows that California has triple the amount of solar megawatt capacity under construction compared to that which is currently operating. Clearly the Sun Rush in California rushes on unabated by CEQA.

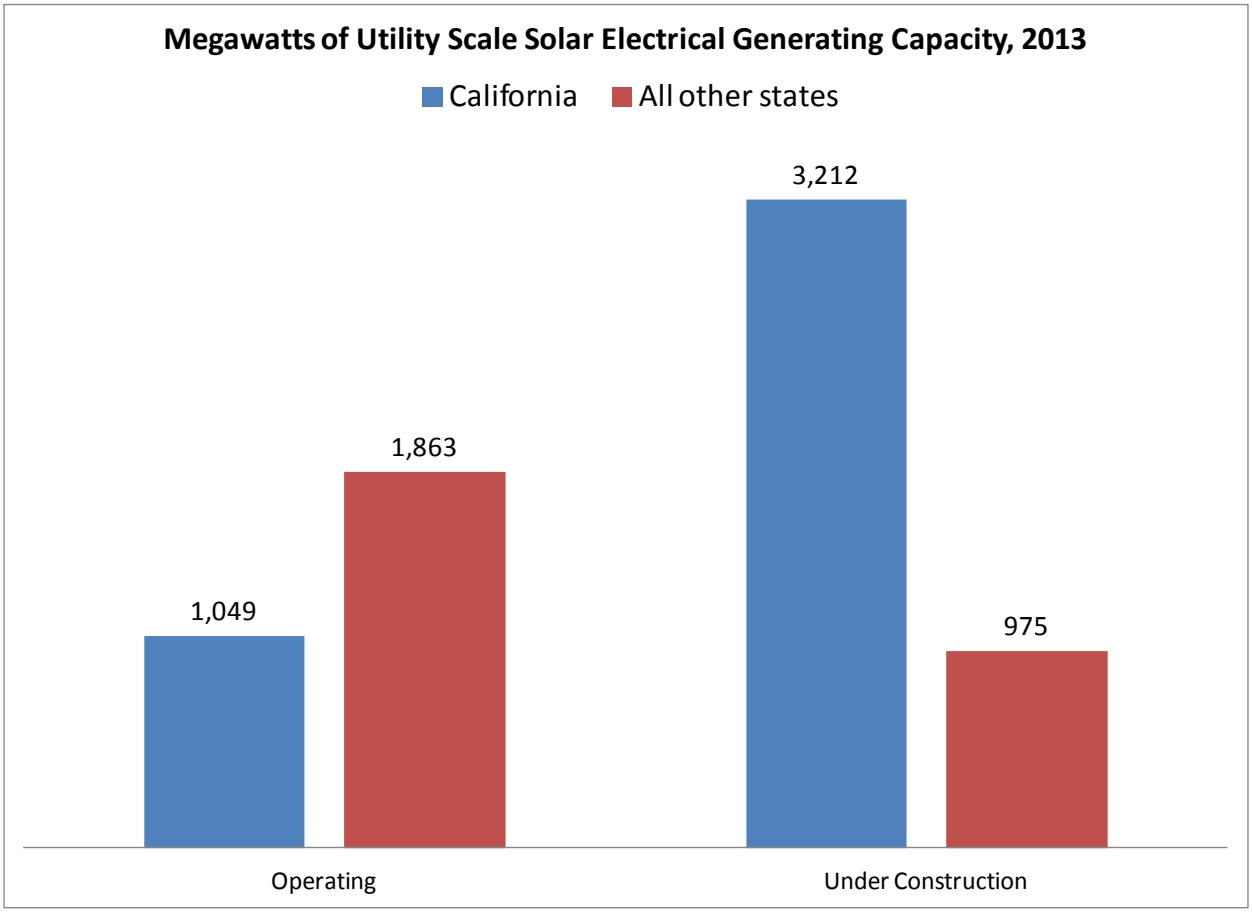

FIGURE 14: MEGAWATTS OF UTILITY SCALE SOLAR ELECTRICAL GENERATING CAPACITY CURRENTLY OPERATING AND UNDER CONSTRUCTION, CALIFORNIA AND ALL OTHER STATES, 2013[xxvii]

We now turn to a set of three case studies. First, we look at the ending of proposals to build large, coal-fired power plants in the late 1970s and early 1980s. This helped stimulate a paradigm shift to alternative wind, geothermal, solar and other alternative sources of power generation along with a strong shift towards natural gas-fired power plants. Second, we look at the role a CEQA lawsuit in 2002 played in catalyzing a paradigmatic shift from dirty growth to green growth in the ports of Los Angeles and Long Beach. Third, we look at a CEQA 1998 intervention that led to the development of a successful dry-cooled natural gas inland power plant which served to demonstrate the soundness of this technology. While wet-cooled newly licensed natural gas power plants in California between 1996 and 2005 captured the very long term use of 100,000 acre feet of inland fresh and recycled water, a CEC paradigm shift towards a policy of encouraging dry cooling essentially stopped additional inland water commitments to wet-cool thermal power plants after 2006.

These case studies exemplify the triple role of CEQA in catalyzing change, bridging regulatory jurisdictions and helping create new paradigms for environmentally friendlier economic development.

Case Study 1: Moving away from Coal towards Non-Traditional Generation of Electricity, 1970-1990

While the Warren Alquist amendment effectively took nuclear power off the table in considering prospective power plants after CEQA, both coal and fuel oil fired plants were being proposed to the California Energy Commission (CEC). For instance, in 1979, Southern California Edison proposed to build the California Coal Project or Cal Coal, a 1500 MW 3 unit coal-fired power plant, in the Mojave Desert. One of the proposed sites for this facility was near Boron, California, very close to Edwards Air Force Base. The Air Force became an Intervener in the CEQA process for the Boron siting of the Cal Coal project objecting generally to the plant's impact on air visibility and air quality from plant emissions. Edwards Air Force Base also objected specifically to the project's effect on:

> flight safety (three 500-foot coal stacks approximately four miles off the main runway and right on a major flight path); air visibility impact by construction dust, coal dust (two 240 train car loads of coal per day), coal loading and handling, additional RV traffic from new road construction, etc.; water, its use, evaporation into the air affecting visibility, its source, impact on regional water use (22,000 acre feet per year), the nonfeasibility of constructing a canal for the water, a pipeline (64 miles) or wells (lowering the water table), the effect of water use on Edwards Air Force Base water supply (contamination since we are in the same water basin), etc.; acid rain and its effects on jet maintenance, etc.; the effect of Cal Coal on the local biota, both endangered species and plant life; transmission lines, and their effect on radio communications and microwave circuitry; CO 2 buildup, because the desert is on an enclosed basin without the ability to have the air clear itself, rather, it tends to recirculate; waste disposal, Class I or II dump siting, evaporation ponds, and disposal of fly ash; and BACT (Best Available Control Technology) concerning hydrocarbons, SO, stack particulates, NO, fuel delivery and handling, and cooling towers...[xxviii]

As one can see, with this particular site, the Air Force was assuming an "environmentalist" position. And this is really the purpose of CEQA—to allow stakeholders including nearby neighbors—to identify from their perspective what are the full environmental impacts of proposed projects. Captain Christopher Kernan in recounting the Air Force's role in this CEQA process noted that:

> ...Edwards Air Force Base and the other Federal Intervenors were forced by the fact that they were representing a specific area to confine all presentations to the Boron proposed site. All other sites, even though potentially unacceptable for environmental or other reasons, were left to the other Intervenors to contend with.[xxix]

Given the opposition of environmentalists like the Air Force along with more traditional environmentalist interveners in CEQA processes considering coal fired power plants in California, Southern California Edison (SCE) shifted its paradigm towards nontraditional energy sources. By the fall of 1980, SCE was announcing a shift in commitments towards renewable energy:

> Southern California Edison Co. Friday [October 17, 1980] became the first major electric utility in the nation to commit itself to large-scale development of unconventional, renewable energy sources such as wind and solar power. The shift in policy, which was praised by environmentalists, could eventually lead to a decision to cancel one or both of Edison's proposed coal projects, which the company had previously been counting on to supply most of its new electric power in the late 1980s....The utility will continue two coal projects now under study—Cal coal in the Mojave Desert and Allen Warner Valley in Nevada and Utah—in case the alternative sources do not pan out[xxx]

We will discuss the Allen-Warner project below. And in 1980, SCE was still hanging onto the possibility of building Cal Coal. So transitioning to alternative energy sources was a process rather than a discrete event.

At roughly the same time that SCE was proposing the Cal Coal project, Pacific Gas and Electric (PG&E) was proposing a $2 billion, two unit, 1600 MW Montezuma power plant burning 16,000 tons of low-sulfur coal arriving by train daily from Utah. While five alternative sites were proposed for this Fossil 1 and 2 project, the Montezuma version of this coal-fired power plant was proposed to be located near Collinsville on the Sacramento River just upstream from the Suisun Marsh in Solano County. It would draw its cooling water, 50,000 acre feet per year, from the Sacramento River's variable-saline estuary waters, and return 30,000 acre feet as wastewater discharge. The difference, 20,000 acre feet, would be evaporated in the wet cooling process. Primary environmental concerns included organisms such as larval fish killed in the cooling process, the effects of discharge water on the estuarine system and Suisun Marsh, and air emissions involving the hourly release of 4800 pounds of nitrogen oxides, almost 2000 pounds of sulfur dioxide and additional significant quantities of hydrocarbons, carbon monoxide and particulate matter.[xxxi] These air pollutants were also beginning to be tied to acid rain problems in the Sierras. In early 1981, UPI reported:

> Acid rain, which has wreaked havoc in other parts of the world, may be threatening the Sierra Nevada, researchers said Sunday.... [E]xperts expressed concern about the impact on the Sierra of any large, coal-burning energy plants. Pacific Gas & Electric Co. planned a coal-fired plant near Collinsville in Solano County, but it was delayed indefinitely because of lack of demand by customers. Kathy Tonnessen, who is conducting a study of the effects of acid in Sierra lakes, said such a plant would be a "huge source" of nitrates and sulfates, ingredients of acid rain.[xxxii]

Despite opposition from environmental stakeholders in the CEQA process, the CEC permitted the Montezuma coal-fired power plant to go forward. However, for both economic and environmental reasons, PG&E shelved Montezuma in favor of smaller, greener power generating facilities. In 1983, the *Christian Science Monitor* reported:

> The giant San Francisco-based utility [Pacific Gas & Electric] has erased or postponed every major new project possible in the last few years, says spokesman Chuck Peterson. One of these was a coal-fired plant scheduled to be built at Collinsville, between San Francisco and Sacramento. "It's completely off the boards," Mr. Peterson says.[xxxiii]

And in 1984, the *New York Times* reported:

> They build windmills. They tap natural steam from below the earth's surface. They even burn walnut shells. While electric utilities in most parts of the country continue to plan in terms of either nuclear or coal, some on the West Coast appear to have a better idea. Instead of expanding their reliance on large centralized power plants in the 1,000-megawatt range, Californians will increasingly be getting electricity from many small and unorthodox sources....These independent energy producers are part of an extended supply system being pioneered by two utilities: the Pacific Gas and Electric Company and Southern California Edison Company. For at least the next 10 years, much of their new capacity will derive from energy technologies that are small, varied, dispersed, renewable and generally owned and operated by third parties - entrepreneurs who tap the energy of such sources as the wind or the sun, convert it to electricity and sell it to the utilities. Southern California Edison plans to add 2,100 megawatts from these renewable or alternative sources to its network by 1992, increasing its relative contribution of the company's total generating capacity to 16 percent from 6 percent. Similarly, Pacific Gas and Electric will add 3,900 megawatts of renewable capacity during the same period, thereby nearly doubling its percentage contribution to 24 percent, not counting its considerable generating capacity from hydro power.[xxxiv]

CEQA intervener objections did not stop the Cal Coal project, but environmental concerns highlighted under CEQA may well have made PG&E more attuned to alternatives to electrical generation from coal. However, both PG&E and SCE

made one last try at building coal plants in the early 1980's by proposing out-of-state coal-fired plants that would bring power into California.

The last coal-fired plant proposed in 1980-81 was to be a Southern California Edison/Pacific Gas & Electric out-of-state coal dual plants located in Utah and Nevada.[xxxv] This Harry Allen-Warner Valley combination entailed a 500MW coal plant in Utah and a 2000MW coal plant in Nevada with 2090MW split evenly between PG&E and SCE with the remaining 410MW going to St. George UT and the Nevada Power Company. To cool the plants, 10,000 acre feet of water would be diverted from the Virgin River for the 500MW Utah plant and an undetermined amount of Clark County waste water would cool the Nevada plant while 11 million tons of coal would be mined annually to fuel these two plants.[xxxvi]

According to former CEC attorney David Mundstock, in the Allen-Warner Valley case:

> [Southern California] Edison, together with PG&E, finally attempted to circumvent CEC jurisdiction with an out-of-state coal plant, the $5 billion, 2,500 MW Harry Allen-Warner Valley Energy System, proposed for Utah and Nevada. Strip mining and coal burning pollution from the project threatened both Bryce Canyon and Zion National Parks in Utah. The California Public Utilities Commission had authority over this application, but the Energy Commission intervened at the PUC to question project need, and the Environmental Defense Fund vigorously opposed it with a new computer model demonstrating there were less expensive alternatives. SCE and PG&E hastily withdrew Harry Allan-Warner Valley on February 11, 1981 in order to prevent the Energy Commission from filing a brief at the PUC explicitly detailing why this large, costly project was completely unnecessary. Extinction had occurred.[xxxvii]

Because the Allen-Warner project was out-of-state, it could only be primarily challenged on economic grounds in front of the California Public Utilities Commission rather than on environmental grounds before the California Energy Commission. CEQA played a smaller role in Allen-Warner in evaluating the environmental impact of the transmission line bringing the electricity into California from the out-of-state plants. However, Allen-Warner was the last effort to propose a coal-fired power plants to meet California electricity demand. CEQA provided a venue in the Cal Coal and Montezuma proposals for the environmental impact of coal-fired electricity to be heard. Mainstream voices like the Air Force joined forces with environmental groups to itemize these costs which were not being picked up in the market. There was, for instance, no market price tag for the visual pollution that would impede air force flight training; nor was there a price tag in the market for the effects of wastewater discharge on the Suisun Marsh. But CEQA provided the venue for these real prices to be registered and put into the calculation of the costs of large scale coal-fired plants. In looking back at the 1970s in a profile of David Roe, an Environmental Defense Fund lawyer, the *San Diego Union* wrote:

> They were the years when environmental activism went from laying down in front of bulldozers to burrowing through reams of utility company documents. It was the time when the era of dynamic energy industry expansion -- grand power plants considered the key to ever cheaper power and ever greater prosperity -- began to die in fits of public hearings, legal briefs and lawsuits. It was the late 1970s, and David Roe was in the middle of it as an attorney for the Environmental Defense Fund. More than any other single group, observers say, EDF during this period was midwife to the birth of the era of diverse, alternate energy forms, many independently owned, as well as to energy conservation.[xxxviii]

And indeed as Figure 10 below shows, the "all other" category for power source in electrical generation in California grows from less than 1% to about 17% of generating capacity from 1970 to 1990 in California while all other sources of power generation in the other 49 states remained negligible over those 20 years.[8]

[8] In Energy Information Administration data, "all other" in 1990 would include both renewable and non-renewable categories such as wood burning. The 1970 data had a wood category but not an all-other category.

Economics played a role in this change as well. Rising interest rates in the early 1970s increased the cost of borrowing for big power projects; and inflation created uncertainties in electricity demand. But these were national phenomena and they did not create a move to alternative energy sources in the other 49 states. The unique influence was California's Energy Commission, its CEQA process, the California Public Utilities Commission's emphasis on electricity conservation and the larger environmental movement in California. These political, institutional, regulatory and legal processes, including CEQA, led to a fundamental change in California's electrical generation fuel mix by 1990 as we saw above. This is an example of CEQA providing a process that helped catalyze change that eventually leads to a paradigmatic shift in the way California utilities envisioned powering electrical generation.

Case Study 2: CEQA and Port Expansion in Long Beach and LA

Port Growth

Colliers International has called the ports of Los Angeles and Long Beach the "Colossus among Giants," and no wonder. In 2011, the Port of Los Angeles was the busiest in the U.S. by container volume and the adjoining Port of Long Beach was the second busiest U.S. port. In 2011, the Port of Los Angeles shipped and received 7.9 million twenty-foot equivalent units (TEU) of container cargo while Long Beach shipped and received 6.1 million TEUs. Together, these two ports accounted for one-third of all container port shipping in North America in 2011 and almost 3 times the volume of New York, the next largest port. In 2011, the Port of Los Angeles accounted for 56% of the traffic going through these two Southern California ports.[xxxix] (See Figure 15.)

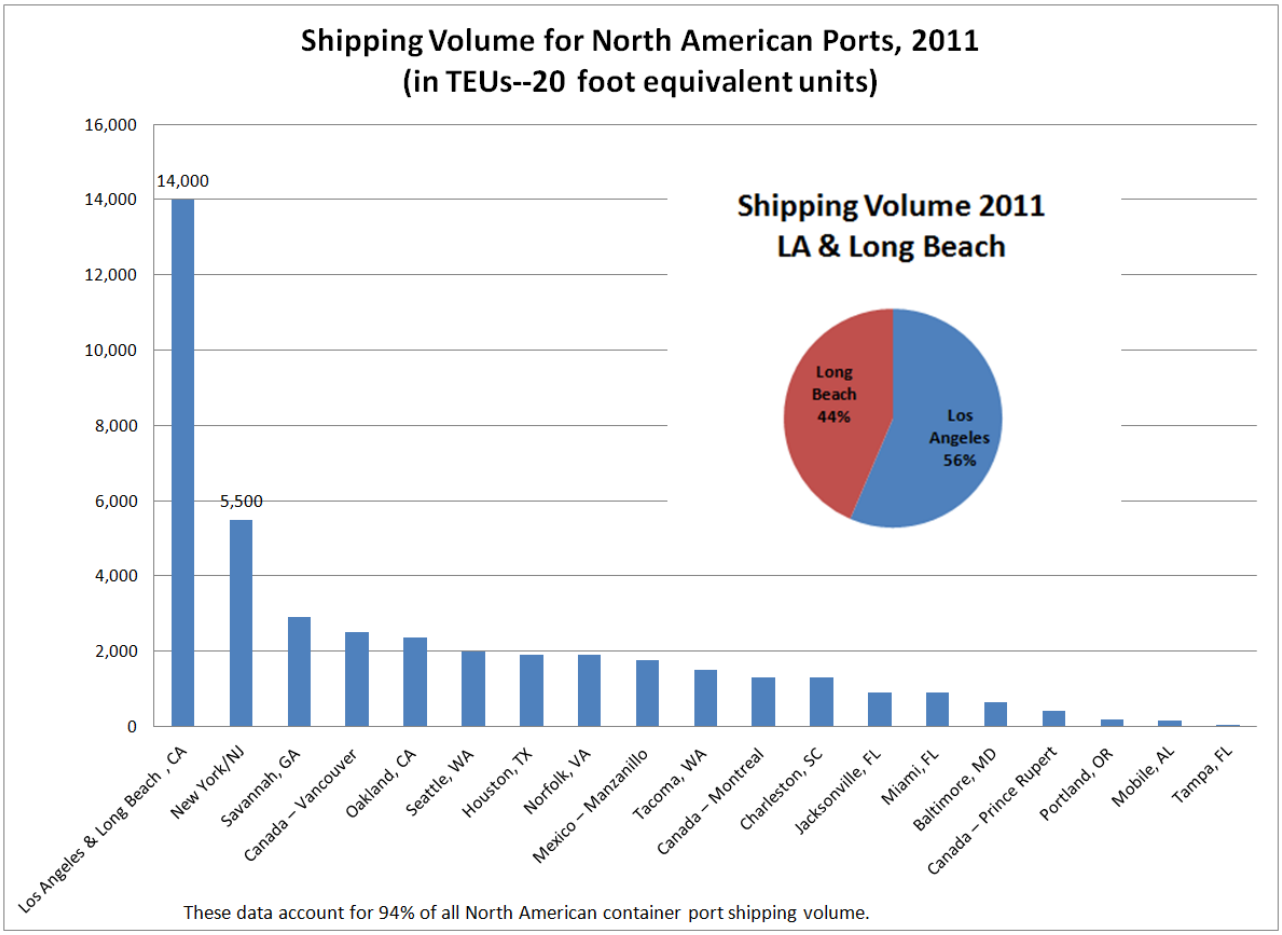

FIGURE 15: SHIPPING VOLUME OF NORTH AMERICAN CONTAINER PORTS, 2011[xl]

Driven by globalization and the expansion of world trade, this twin-port colossus has been growing rapidly since 1980. Figure 16 shows that in comparison to 1980, the Port of Los Angeles now ships and receives 13 times as much cargo. In comparison to 1995, the Port of LA now ships and receives 3.2 times the volume of shipping. The Port of Long Beach has more-or-less grown in tandem with the Port of LA now shipping and receiving 2.1 times as much cargo as it did in 1995.

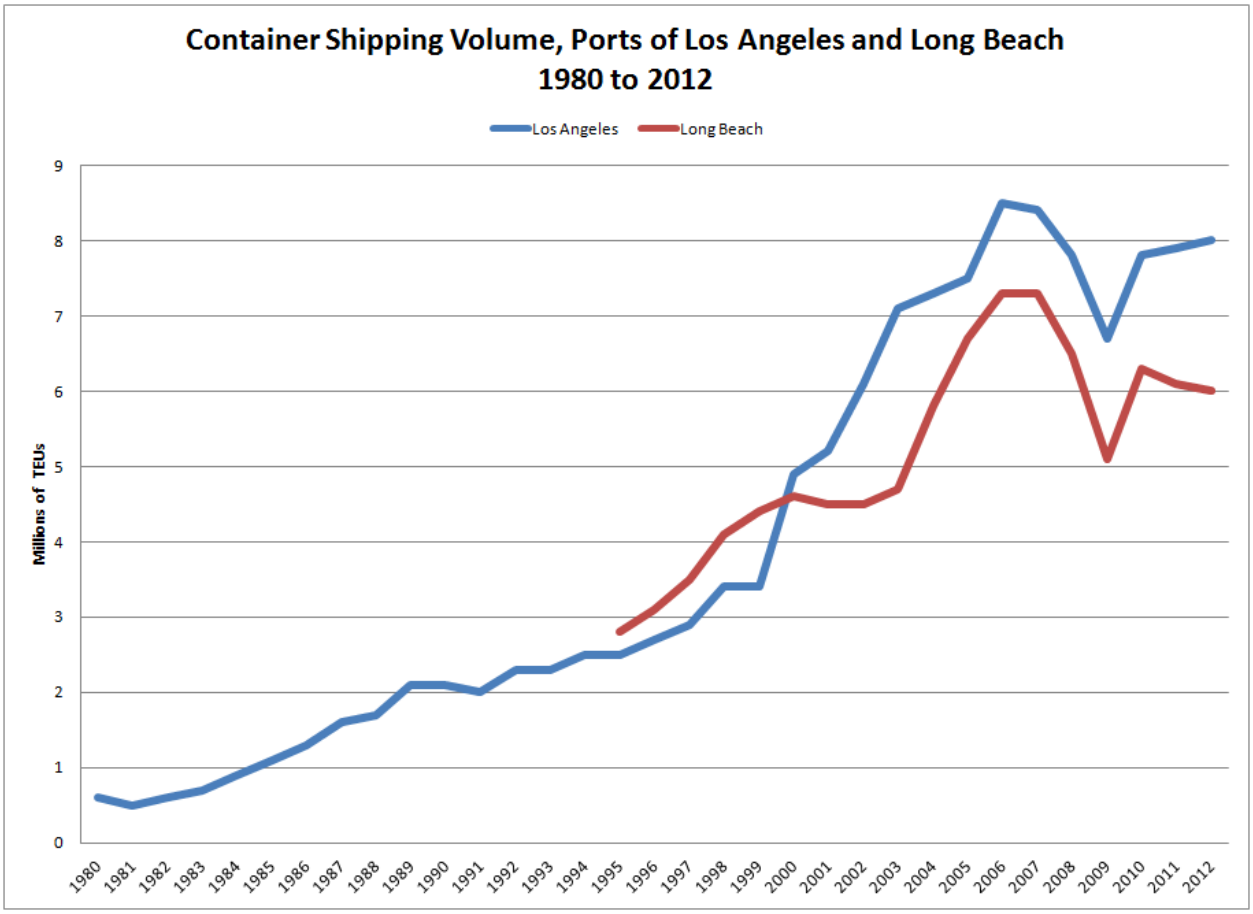

FIGURE 16: INCREASE IN PORT OF LOS ANGELES SHIPPING VOLUME 1980 TO 2012 (IN MILLIONS OF TEUS)[xli]

Port Pollution

This rapid growth in shipping has brought jobs and wealth to Southern California, but it has also brought increased pollution. In 2004, the *Long Beach Press Telegram* reported:

> A burst of thick smoke blows from a stack on a football-field-long cargo ship as it steams away from the Port of Long Beach. A diesel big-rig trudges toward the port, sending small clouds of exhaust into the air. A decades-old locomotive winds its way around one of the port's container terminals, pumping out tufts of black fumes. It's a scene that plays out thousands of times a year at the twin ports of Long Beach and Los Angeles. Together, they are the economic workhorse of the region. They are also its environmental challenge....
>
> The ships and trucks serving the ports account for nearly 10 percent of the Los Angeles area's emissions of nitrogen oxides (NOx), which combine with oxygen to form ozone, a key component of smog. This does not include emissions from port-related trains and diesel-powered equipment, whose pollutant output has yet to be measured.[xlii]

After this *Press-Telegram* eight-part study of pollution of trucks, rail and ships in these two ports, it became widely known that the two ports accounted for the single largest source of air pollution in Southern California.[xliii] The estimate that the

two ports contributed about 10% of the nitrogen oxides emitted into the L.A. Basin was based on data from the South Coast Air Quality Management District. The Long Beach *Press-Telegram* pie-chart showing pollution sources is reproduced in Figure 17. This figure shows that 4.7% of nitrogen oxides came from ships in the two ports, and 4.4% came from big rig trucks while within the port boundaries. In addition to this total of 9.1%, the ports had an undetermined share of the emissions from diesel equipment and trains—thus, the widely quoted 10% of nitrogen oxide pollutants stemming from activity within the two ports. Needless to say, the concentration of pollution emissions within the confines of the ports disproportionately affects the local communities surrounding the ports.

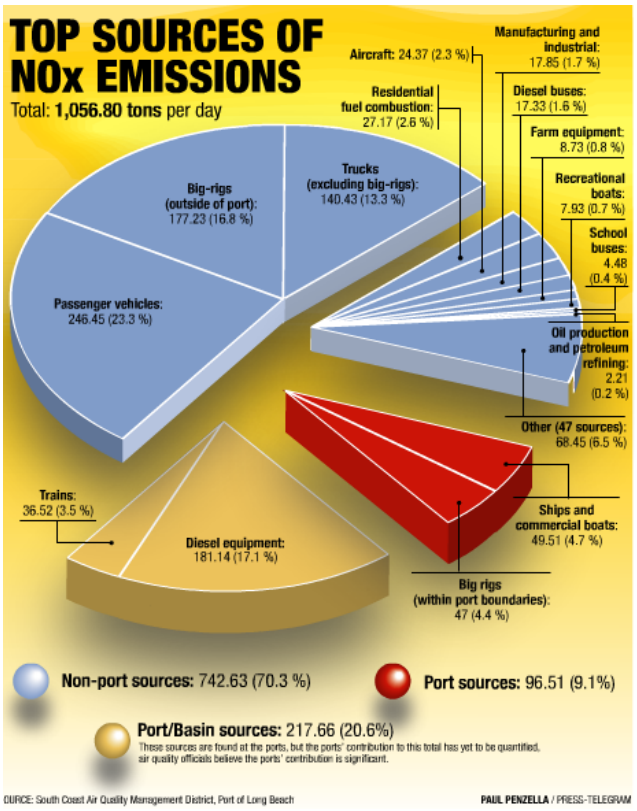

FIGURE 17: SOURCES OF NITROGEN OXIDE POLLUTION IN THE CALIFORNIA SOUTH COAST AIR QUALITY DISTRICT[xliv]

Port Pollution Health Impact

Pollution from the ports has been linked to cancer and respiratory diseases such as asthma. In 2004, the *Press-Telegram* reported:

> It starts with a tickle in the throat. Then comes the coughing. And the wheezing. It feels like someone is pressing against your chest and back. More air is coming in than can be breathed out. Pressure builds and panic sets in....
>
> In the Long Beach school district, nurses say asthma is the number one cause of student absenteeism each year, a statistic mirrored by the rest of the state. Doctors aren't sure how, and for exactly how long, but they are sure that air pollution makes asthma worse. And more than 10 percent of the region's smog-forming pollutants originate at the ports. For those who live near the ports and their trucks, trains, ships and equipment yards, it's a matter of particular concern.[xlv]

That localized pollution brought with it inordinately high health risks near the ports was revealed as early as 2000 in a study by the Southern California Air Quality Management District.[xlvi] A 2006 California Air Resource Board study of cancer risks from diesel particulate matter stemming from the ports concluded:

> The study evaluated the diesel PM emissions on a mass basis and with respect to what impacts those emissions have on potential cancer risks in communities near the ports. With respect to the mass emissions, the combined diesel PM emission from both ports is estimated to be about 1,760 tons per year in 2002. This represents a significant component of the regional diesel PM emissions for the South Coast Air Basin at about 21% of the total basin wide diesel PM emissions in 2002....
>
> The combined diesel PM emissions from the ports result in elevated cancer risk levels over the entire 20 mile by 20-mile study area. In areas near the Port boundaries, potential cancer risk levels exceed 500 in a million. As one moves away from the ports, the potential cancer risk levels decrease but continue to exceed 50 in a million for almost the entire modeling domain.[xlvii]

But despite these evident and apparently known local health risks in the early 2000s, port growth and pollution growth promised to continue increasing hand in hand. In a December 2003 presentation for the Port of Los Angeles by T.L. Grant of the California Air Resource Board Maritime Air Quality Technical Working Group, tons per day of five monitored pollutants were expected to roughly double from 2000 to 2020. (See Figure 18.)

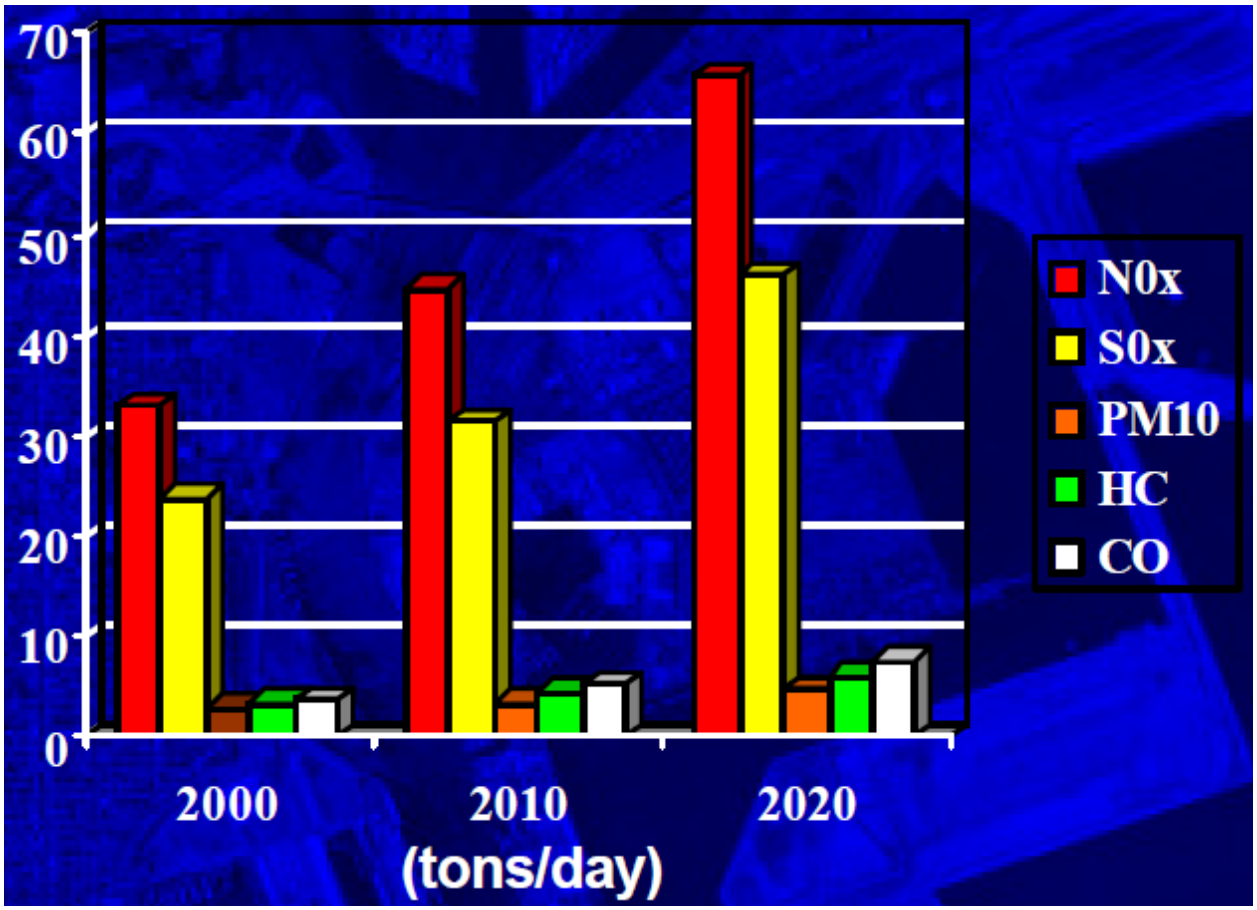

FIGURE 18: PROJECTED INCREASE IN TONS PER DAY OF POLLUTION FOR NITROGEN OXIDES, SULFUR DIOXIDE, LARGER PARTICULATE MATTER (PM10), HYDROCARBONS AND CARBON MONOXIDE[xlviii]

The Role of CEQA: an Introduction

In response to the environmental downsides of port growth, local homeowner groups in an alliance with the National Resource Defense Council filed suit under CEQA in June 2002 alleging that the Army Corps of Engineers improperly permitted the Port of Los Angeles to begin building a very large container terminal without appropriately taking into consideration the full pollution and health impacts of this port expansion.[xlix] This court case which comes to involve both the ports of Los Angeles and Long Beach provides an example of the multiple and evolving roles CEQA can play in addressing major, serious and dangerous environmental problems.

As shown above, in the early 2000's, taken together, these two ports not only accounted for more international trade than any other port in the U.S., but they also accounted for more air pollution than any single other source in the Los Angeles basin. So the dilemma was that given globalization, the ports needed to expand; but given the environmental hazards of expansion, the ports needed to not expand.

- In the beginning, CEQA provided a vehicle whereby local communities threatened by port pollution could stand in an adversarial relation to port authorities and shipping interests who were feeling the imperative to grow.

- But over time, CEQA, as a legal vehicle, helped transform that port-community adversarial relationship towards more collaboration in envisioning green-port growth where port expansions went hand-in-hand with environmental improvements.
- Then CEQA played a third role, providing the port authorities with one of two legal pillars with which to build a coherent yet living and evolving approach to implementing environmental goals in the face of a fragmented and frustrated set of regulatory agencies which by themselves could not effectively oversee the multiple environmental jurisdictions created by port activity.

The Catalyst: CEQA Lawsuit (2002)

Known colloquially as the China Shipping case, the San Pedro and Peninsula Homeowners' Coalition, the San Pedro Peninsula Homeowners United, the Coalition for Clean Air and the National Resources Defense Council sued the City of Los Angeles and the ports for approving a significant expansion of dock capacity for the China Shipping Company without conducting a recent and relevant environmental impact review (EIR).[lh] The key issue was whether an EIR done several years before was sufficient under CEQA in analyzing the environmental impact of this new port expansion. In deciding in favor of the plaintiffs, in October 2002, the court said:

> An excerpt from the "Introduction" of the amicus curiae brief filed by the Attorney General provides a succinct statement why CEQA was violated:
>
> "This case goes to the first principles of CEQA. The CEQA process is intended to be a careful examination, fully open to the public, of the environmental consequences of a given project, covering the entire project, from start to finish. This examination is intended to provide the fullest information reasonably available upon which the decision makers and the public they serve can rely in determining whether or not to start the project at all, not merely to decide whether to finish it. The EIR is intended to furnish both the road map and the environmental price tag for a project, so that the decision maker and the public both know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey."[li]

Settlement Agreement (2003)

With this decision in hand, the port and community-plus-environmental groups went into discussions that led to a settlement in March of 2003 which was finalized in 2004. That settlement agreed on seven main items:

1. Establish a $50 million fund to mitigate the impacts of Port operations on the surrounding communities of Wilmington and San Pedro, including $10 million for incentives to clean up independently-owned diesel trucks serving the port, $20 million to be spent over four years to reduce air pollution from Port operations, and $20 million to offset aesthetic impacts in both San Pedro and Wilmington, including open space and parks, landscaping and beautification and other community-based projects;
2. Prepare a full environmental review of the impacts of the China Shipping terminal and mitigate those impacts;
3. Provide electric power for ships berthed at the China Shipping terminal so they do not run their diesel engines while docked, and spend up to $5 million on the retrofit of China Shipping vessels to accommodate their use of electric power;
4. Require the use of cleaner alternative fuel heavy-duty yard trucks at the terminal;

5. Replace the four existing 16-story cranes at the terminal with "lower-profile" cranes to reduce the visual impact, and require all new cranes to be lower-profile if available at a cost of no more than $8 million each;
6. Develop and implement a traffic plan for the terminal and other Port operations that must begin implementation this year; and
7. Assure the continuation of the Port Community Advisory Committee that provides community input to the Board of Harbor Commissioners.[lii]

This agreement had concrete practical elements in it such as providing a fund to help mitigate the environmental impact of port expansion on the surrounding community and beginning a process of electrifying the port so that docked ships' electricity would not be fueled by dirty, on-board diesel generators. But in the longer run, perhaps the more important element of this agreement was not only insuring the continuance of the Port Community Advisory Committee but laying the foundation for a paradigm shift where the port and surrounding communities could partner in envisioning port growth as green port growth. In short, CEQA helped the ports to move towards a new model of growth where economic and environmental objectives were jointly considered. Steps in this direction were taken over the next few years after the settlement of this case.

First Steps: Practical and Process

The first practical step was to move towards the electrification of the port so that docked ships could plug into landside electricity. This was neither easy nor cheap. Large container ships and oil tankers have large electrical demand and different electricity voltages. Furthermore, new technologies were needed to meet one widely desired dockside approach called cold-ironing. As the Long Beach *Press-Telegram* noted in 2004:

> Air regulators and environmentalists alike are championing ``cold-ironing,'' a term used to describe the powering of ships by electricity while in port. Currently, when ships are docked in port they power down their main engines and use auxiliary diesel and steam engines to power their refrigeration, lighting and pumping processes while at berth. [liii]

But it would take five more years before the new technology would be in place. In the shorter run, perhaps the major impact of the China Shipping CEQA case was that it put environmental issues on the front burner of the stove that was cooking up port expansion. Again the *Press-Telegram* noted (2004):

> Two years ago, the Natural Resources Defense Council sued the Port and City of Los Angeles for failing to prepare an environmental evaluation of the recently completed China Shipping Lines terminal. The court ruled in favor of the council and shut down the terminal....[Container Transportation Services] APL spokesman [Scott] Dailey says the China Shipping case made his company take notice. ``We're always mindful of the environment, but when NRDC sued the Port of L.A., that really brought it home,'' he says.[liv]

But the changing of perspectives would be an evolving process that EIR procedures would help facilitate. Minds were not changed overnight. For example, again in 2004, the *Press-Telegram* reported:

> How much of this pollution is the fault of the ports? "It's easy to say, `Blame the port,'" says John Calhoun, one of the five appointed harbor commissioners who oversee Long Beach's port [and President of the Harbor Commission]. "We get blamed just because of a lack of understanding. It's just easy shorthand."[lv]

Nonetheless, later in the year, he states in a press release regarding the first voluntary provisioning of dock-side electricity for some ships:

> "The community has given us the charge to reduce pollution and clean up the air without slowing down commerce or eliminating transportation-related jobs," said John R. Calhoun, president of the Board of Harbor Commissioners. "It is not an easy task, but with help from BP, we are answering the call."[lvi] [9]

One can sense in Mr. Calhoun's two statements that he is being pulled between economic concerns for the business of the harbor and newer concerns for public opinion, local community pressure and broader environmental problems. That is precisely what CEQA was meant to do: put on the table of public decision makers, environmental concerns to be weighed against economic considerations. As we shall see below, CEQA is filling a gap. Standard environmental rules were poorly adapted to ports where the various activities of ships, trucks, railroads and dock facilities fell under the jurisdiction of different local, state, federal and international bodies. We will see that not only did CEQA put the environment into the decision making mix. CEQA also filled in the gaps created by a fragmented regulatory regime.

The Bridge: Fragmented Regulations/Frustrated Regulators

While some port authorities and shipping business interests were taking greater note of the environmental side of their business, environmental regulators were expressing frustration with the fragmentation of authority when it came to overseeing an international port with floating, stationary, road and rail sources of pollution each coming under different environmental rules. We quote at length a February, 2004 story by the *Press-Telegram* examining how fragmentation was tying the hands of environmental regulators overseeing port pollution:

> With 10 percent or more of local air pollution coming from the ports, you might expect some super agency to oversee its cleanup. Instead, a confusing tangle of governmental entities - local, state, federal and international - is responsible for regulating the various sources of pollution at the ports. Indeed, the four main sources of pollution at the port (trucks, terminal equipment, ships and trains) are regulated by different agencies....
>
> -- Ships, because they cross international waters, are regulated by a branch of the United Nations, called the International Maritime Organization. Only ships flying U.S. flags -- and there are few of them -- are regulated by the United States.
>
> -- Trains, because they cross state lines, are regulated by the federal government, through the U.S. Environmental Protection Agency. Other federally controlled sources include commercial aircraft and marine vessels.
>
> -- Trucks and mobile terminal equipment are regulated by the state Air Resources Board, which controls all pollution sources in California that aren't stationary. That includes motor vehicles, fuels and consumer products.
>
> -- Stationary sources -- such as power plants, oil refineries, factories and even the corner gas station -- are the only things regulated by the local AQMD [Air Quality Management District]....
>
> In a sense, the AQMD is handcuffed by its parent agencies, the state Air Resources Board and the EPA....Air Resources Board spokeswoman Gennet Paauwe acknowledges the local air districts are fighting for more leverage.

[9] BP, British Petroleum, was the first to agree to plug in its ships. In the same news release BP said:

> ``Plugging in our ships will cost us more to off-load the crude, but the increased costs are relatively small when you consider the environmental benefits from the project,'' said Tim Scruggs, BP Carson business unit leader/refinery manager.

Again you can see the impact of CEQA in wedging environmental concerns onto the table to be weighed in this case by business folks against their standard concerns for direct economic costs.

> ``We definitely hear from the air districts," she says. ``They feel like they don't have control over measures that could reduce their emissions. There is frustration on all sides."
>
> `There are legal and practical constraints on the type of regulations that the federal government can implement," says Roxanne Johnson, an environmental protection specialist with the U.S. EPA. ``We believe that the best plans can be put together only at the state and local level, where there is far more flexibility and where these decisions appropriately belong."[lvii]

It is often said that CEQA fills in the gaps where other environmental regulations are lacking. The ports of Los Angeles and Long Beach are a poster child for gaps in environmental regulations because of the varying sources of that pollution—international ships, interstate rails, mobile trucks and stationary dock facilities (cranes, generators etc.). It was becoming clear that if the ports were to tackle their environmental problems, they would have to start thinking outside the formal regulatory structure and the sorts of fragmented compliance competing agencies tossed over the ports. An important moment came in late 2004 when the Harbor Commission began to embrace a cooperative relationship to the local community and environmental groups.

Paradigm Shift: From Adversary to Partner

In September 2004, the *Press-Telegram* reported:

> Harbor commissioners did an unusual about-face Wednesday, voiding an environmental evaluation they had already approved on the proposed expansion of Pier J in the Port of Long Beach. The unanimous decision came during a special morning meeting amid heavy criticism by environmentalists and air regulators of a port-prepared environmental impact report, or EIR, on a 115-acre expansion of Pier J....
>
> ``This EIR has serious deficiencies," [Gail Ruderman Feuer, attorney at the Natural Resources Defense Council] said. ``There's absolutely more that can be done."
>
> Harbor Commissioner Jim Hankla said he was impressed by the NRDC's thoroughness and willingness to solve problems outside of court.
>
> ``The NRDC has done this board a great service," Hankla said. ``Every bit of this EIR will be reworked. As one commissioner, I promise that."...
>
> ``It's not just Pier J we're worried about," said Don May, president of Lakewood-based California Earth Corps. `` I hope this will be more than a turning point. I hope it will be a paradigm shift."[lviii]

This sort of public dialogue is precisely what CEQA seeks to create. Again, as the Court said in China Shipping one year earlier:

> The CEQA process is intended to be a careful examination, fully open to the public, of the environmental consequences of a given project, covering the entire project, from start to finish....The EIR is intended to furnish both the road map and the environmental price tag for a project, so that the decision maker and the public both know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey."[lix]

This was the paradigm shift provided by CEQA. This fully open discussion of an EIR designed to map out the environmental consequences of a port expansion allowed not only local community groups and concerned environmental groups but also local air quality regulators frustrated at their own fragmented authority to participate with the Harbor Commission in assessing the true environmental impact of inevitable port expansion. This regulatory process let the

regulators, who had been sidelined by the gaps, holes and fragments of multiple jurisdictions and multiple emission sources, back into the consultative decision-making process.

LA Mayor's No Net Increase Initiative (2005)

In this evolving climate, James H. Hahn, Mayor of Los Angeles (from July 1, 2001 to July 1, 2005) created a No Net Increase [in port pollution] Task Force (NNI) which reported to the Mayor in June, 2005 on the various things the Port of Los Angeles itself could do to stem pollution.[10] The task force consisted of "diverse groups of stakeholders in the Port community." And the report consisted of a compilation of "recommendations and strategy"[lx] to achieve no net increase in air emissions. Because most of these initiatives and strategies involved inducing second-party ships, trucks and trains to alter their behavior, the port needed a legal hook to justify its own imposition of environmental standards and goals. It did this through its rights as a landowner renting space and its obligations as a landowner under CEQA. As the report stated:

> NNI Measures is [sic] tied to the Port's economic interests given its obligation to mitigate under CEQA and its duty not to harm the surrounding public.[lxi]
>
> CEQA's primary objectives are to disclose to decision makers and the public, the significant environmental effects of proposed actions and to require agencies to reduce or avoid environmental effects by implementing feasible alternatives or mitigation measures to projects. In addition, CEQA provides for disclosure of why agencies approve projects where there are significant effects, provides for coordination among agencies, and enhances public participation in the planning process. Implementation of the No Net Increase Plan would require approval by a decision-making body, and therefore, would be subject to considerations of CEQA either through approval of the Plan as a whole, or approval of individual measures contained in the document.[lxii]

Thus, CEQA becomes a legal leg upon which an NNI program could be developed and implemented, overcoming the fragmentation of environmental rule-setting bodies. So between the China Shipping Case of 2002 and the NNI Task Force report three years later, CEQA filled three distinct but related and intended roles: first, it allowed excluded constituencies to have their day in court in an adversarial relationship with the Port. Then, CEQA morphed into an institutional vehicle in which the Port and community and environmental stakeholders could travel towards a consensus in envisioning green port growth. Then, CEQA morphed once again into a legal leg upon which the Port and its partners could stand in implementing and enforcing green port growth where fragmented regulatory environmental jurisdictions did not provide an adequate purchase.

From NNI to CAAP: the Clean Air Action Program (2006)

[10] This task force exploited an existing Harbor Commission goal of NNI set in 2001 by adding community and environmental input to attempt to achieve a collective consensus on how to achieve NNI. In this, one can see not only the spirit of CEQA but the echo of the China Shipping case which occurred after the Harbor Commission goal of NNI and before the establishment of this task force.

> In October of 2001, the Board of Harbor Commissioners for the Port of Los Angeles (Port) established a new environmental policy, which set as a goal, No Net Increase (NNI) in air emission from future Port operations, and set 2001 as the baseline year. This report documents the results of an eight-month stakeholder process set in place by Mayor James K. Hahn and Councilwoman Janice Hahn "…to build consensus on an innovative and realistic strategy to achieve 'No Net Increase' at the Port of Los Angeles."

p. ES-1 of Report, http://www.portoflosangeles.org/DOC/REPORT_NNI_Final.pdf (accessed February 14 2013)

In November, 2006, in cooperation with the South Coast Air Quality Management District, the California Air Resources Board and the U.S. Environmental Protection Agency, the two ports of Los Angeles and Long Beach jointly developed an extension of NNI, the Clean Air Action Plan (CAAP). Community groups, faith-based groups, labor and environmentalists, were also at the table developing the CAAP. This plan was an implementation of NNI goals in that it sought to balance environmental and growth concerns by creating a comprehensive strategy for reducing port-related air pollution while allowing for continues economic growth and job creation.[lxiii] This CAAP program:

* Would have a total five-year cost of about $2.1 billion

* Would require cargo ships to use low-sulfur fuels within 40 miles of port by 2008

* Would replace or retrofit older diesel trucks calling regularly on the ports by 2011

* Would reduce overall diesel-related particulate matter by 47 percent

* Would reduce overall smog-forming nitrogen oxide emissions by 42 percent[lxiv]

These goals were imposing changes in the activities of those who used the ports. The legal foundation for these requirements were port landowner rights along with port CEQA responsibilities. Together, these formed the legal basis for setting and imposing CAAP goals.

Underwater Hookups and Cold Ironing: Electrifying the Ports (2009-11)

Recall that in 2004, the Harbor Commission joined with BP in an effort to create a land-based source of electricity for BP's tankers.

> "The community has given us the charge to reduce pollution and clean up the air without slowing down commerce or eliminating transportation-related jobs," said John R. Calhoun, president of the Board of Harbor Commissioners. "It is not an easy task, but with help from BP, we are answering the call."[lxv] (August 2004)

The *Press-Telegram* reported in June, 2009 that an underwater outlet had been completed for BP's oil tankers:

> It took five years and $23million, but BP and the Port of Long Beach have finally finished the electrification project at one of the nation's busiest oil terminals. The project allows BP's massive tankers to shut down their soot-spewing auxiliary diesel engines and plug into oversized electrical outlets while visiting Pier T. That is expected to remove at least 50 tons of pollutants from local skies each year. Ships typically run their auxiliary engines around the clock while berthed to power lighting, refrigeration, pumps and other onboard equipment.
>
> The Berth T121 project is an engineering feat, but as is the case with many pioneering ventures, the project was fraught with delays, cost overruns and engineering miscalculations. Scheduled for completion in 2006, it only began cold-ironing permanently this year. Still, when people are getting sick from foul air caused by port industry, the ends arguably justify the means.[lxvi]

When the first tanker docked at this new facility, the *Press-Telegram* reported:

> The giant cable reeled into position, an engineer pulled the handle, and like that, pollution equivalent to 187,000 passenger cars was lifted from local skies. A 941-foot BP oil tanker that just arrived from the Alaskan frontier became the globe's first such vessel to plug into a dockside electrical outlet Wednesday....
>
> Electrification required port engineers to build a million-pound underwater outlet anchored by a series of 168-foot concrete pilings and holding a massive steel cable that connects to the ship.

> The cable provides 6,600 volts of electricity - enough to power 5,500 homes - to the massive tankers, allowing operators to completely cut their auxiliary engines while berthed....
>
> Dockside electricity, also known as cold-ironing, has emerged as a favored method to cut emissions from port industry in the past year. Similar efforts have been introduced at three container ship terminals in Long Beach and the neighboring Port of Los Angeles, with several more expected to come online in the coming year. Electrifying oil tankers, however, is seen as more critical because of the vessels' tremendous power demand and fuel consumption while loading and unloading.[lxvii]

Dockside electricity (cold ironing) was in place for cruise ships by 2011:

> The Port of Los Angeles is now providing shore-side power to three separate cruise lines using its Alternative Maritime Power mobile power system....Auxiliary engines providing maintenance power while docked generate more than half of all air pollutants emitted by a typical cargo vessel calling at the port. Cruise ships must generate even more maintenance power while docked and thus emission reductions from using the AMP system are even more significant. Using AMP, just one variation of a shore-side power system, vessels plug into the landside power grid, enabling them to turn off their auxiliary engines.
>
> The port claims to be the first port in the world to provide shore-side power to three cruise lines and the first port where two cruise ships can be connected simultaneously. The port also offers both 6.6 kV and 11 kV electrical power distribution systems – the two most commonly used aboard cruise ships.
>
> According to the port, the typical power demand of the cruise ships calling at the port is anywhere between 8 to 13 megawatts of power – roughly enough to power from 1,000 to 2,000 homes. The port's AMP system can deliver a maximum of 40 megawatts of power, with 20 megawatts of power delivery capacity to each of the two different ships. The port first installed the AMP system in 2004 and now features three major container terminals with the system. The neighboring Port of Long Beach also features shore-side power at several locations.[lxviii]

CEQA: A Living Law Allows the LB Port to Plan and Expand

In 2009, the Port of Long Beach released an EIR under CEQA which set the basis for a revision of CAAP and an expansion of the port. The *Press-Telegram* reported in April 2009:

> Port of Long Beach authorities are preparing to release a long awaited document expected to clear the way for the harbor's first major redevelopment in nearly eight years. The document spells out the environmental impact of a $750million renovation of the port's Middle Harbor project, which consolidates and modernizes Piers D, E and F. The project, expected to take 10 years, would facilitate a doubling of cargo through the three piers while cutting pollution in half from 2005 levels, according to the 1,500-page environmental impact report....
>
> This would be accomplished, port officials say, by expanding on-dock rail, incorporating electric and low-emission cranes and equipment and requiring the use of low-emission trucks. Pollution would also be cut by electrification of ships calling at the site in a process known as "cold ironing," where a ship would plug into a dockside outlet while berthed in port....
>
> During a public review process that ended Aug. 8, port authorities accepted 63 written responses and dozens of public comments on the plan. Under California law [i.e. CEQA], they were obligated to review, consider and respond to those comments before submitting final details to federal, state and local regulators for approval.[lxix]

This CEQA EIR process then helped lead to a revision and update of the two ports CAAP. In that update, the CAAP stated:

1. The San Pedro Bay ports are committed to expeditiously and constantly reduce the public health risk associated with port-related mobile sources, and implement programs in the near-term that will achieve this goal.
2. The San Pedro Bay ports are committed to facilitate growth in trade while reducing air emissions.
3. *The San Pedro Bay ports will focus on lease amendments/renewals and California Environmental Quality Act (CEQA) evaluations as mechanisms to establish provisions and requirements in leases consistent with pursuing the Clean Air Action Plan goals.* [emphasis added]
4. The San Pedro Bay ports will implement tariff changes as needed to affect activity changes that will result in emissions reductions.
5. *The San Pedro Bay ports will work with the international, national, state and regional regulatory agencies to influence changes in regulations that will implement uniform requirements to reduce emissions from port operations.* [emphasis added]
6. The San Pedro Bay ports are committed to monitor, document, and report on performance of their efforts under the Clean Air Action Plan and will update the plan on a regular basis.[lxx 11]

Emphasis has been added to the original in points 3 and 5 to show how CEQA helped provide the regulatory glue for CAAP and helped provide the immediate fix for regulating and improving the ports' environment now while awaiting the future moment when regulatory rule-and-jurisdiction fragmentation might be overcome with a uniform set of international, national, state and regional set of rules and jurisdictions. The beauty of CEQA is its original intent: clearly identify the environmental impacts of a project or activity, explicitly involve stakeholders including local communities in evaluating and assessing possible environmental impacts and mitigations, and move forward balancing on a case-by-case basis environmental and economic costs and benefits of development. In the case of the ports of Los Angeles and Long Beach, this flexible approach has allowed the ports to address the dual needs of green growth without waiting for the future time when there is no fragmentation in regulatory jurisdictions nor frustration from gaps and holes in environmental regulatory rules.

CEQA, NNI, CAAP and a Cleaner Port

Donna Ethington remembers the putrid smells and diesel fumes that would waft into her Wilmington office near the Port of Los Angeles. The smell from the trucks and ships at the port was so bad she couldn't keep the doors and windows open. Just five years later, Ethington is breathing easier.

> "My office is right in this port—I'm there 24/7 unless I'm in a meeting somewhere. I can tell you that there has been a huge reduction in emissions," said Ethington, a member of the Wilmington Neighborhood Council who has lived in the area for 32 years and campaigned for a cleaner environment.[lxxi]

Recall that in 2002, analysts expected that port growth and port pollution would be coupled together in an inevitable chaining of dirty growth. We replicate Figure 18 in Figure 19 and compare it to the actual percentage decrease in nitrogen oxides, sulfur dioxide, larger particulate matter (PM10), hydrocarbons and carbon monoxide for the Port of Long Beach over the period 2005 (after the China Shipping case) to 2011. These figures need to be read with care because the 2002

[11] To a certain extent, many of these commitments are aspirational as opposed to enforceable commitments. Furthermore, port-community relationships are not without conflict and some of that conflict may re-emerge in adversarial legal battles. All that being said, in comparison to port-community relationships prior to 2002, they are substantially more cooperative now just as in comparison to before 2002, pollution levels are substantially improved.

projections were in tons per day and the actual 2005-2011 measurements were in percent decline. The reader should notice that the 2002 tonnage projections translate roughly into an expected doubling of pollution. We compare LA projections with Long Beach actual changes because the Port of Long Beach has published emission data for each of these pollutants. We will show below that Los Angeles has experienced similar percentage declines in pollution.

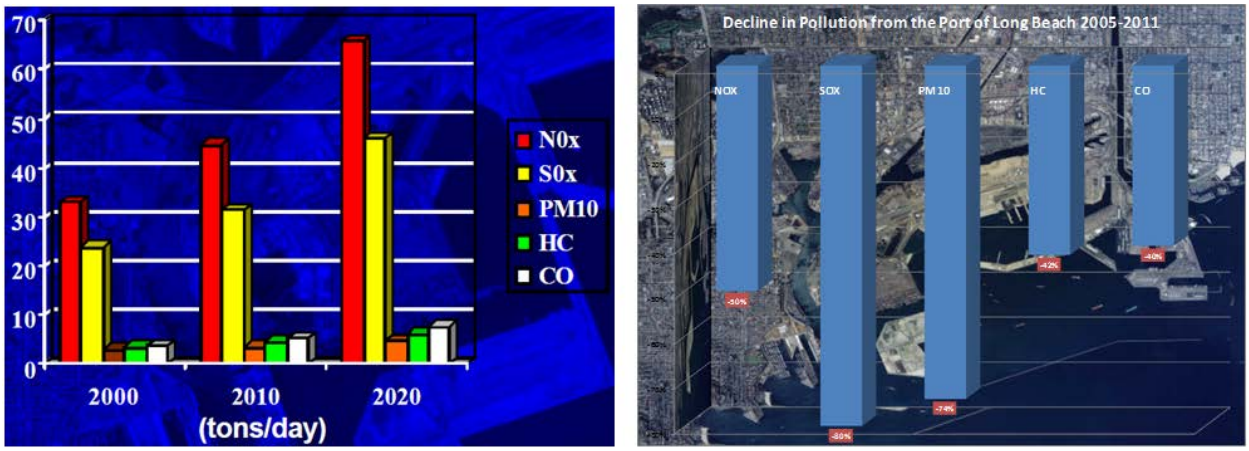

FIGURE 19: COMPARISON OF 2002 PROJECTED INCREASE IN TONS PER DAY OF POLLUTION FROM 2000 TO 2020 FOR THE PORT OF LOS ANGELES TO ACTUAL PERCENTAGE DECLINE IN THESE SAME EMISSIONS IN THE PORT OF LONG BEACH 2005-2011 [lxxii]

The basic point is this: with the China Shipping CEQA lawsuit and the subsequent NNI and CAAP initiatives, from 2006 forward, pollution and growth in the ports were decoupled and the ports of Los Angeles and Long Beach became green ports. Green port is not just an advertising slogan. Greening the ports means exactly what happened after China Shipping: port growth and port pollution were decoupled and port expansion with pollution diminution could go hand-in-hand.[12] Note: a small part in the diminution of port pollution can be attributed to the Great Recession and consequent slowdown in port traffic. In Long Beach, TEUs were down 10% and metric tonnage was down 3% between 2005 and 2011. [lxxiii] But emissions were down 40% and more.

For the Port of Los Angeles, we can track when the decoupling of growth with pollution occurred and when the port started to engage in green growth. In the case of diesel particulate matter (DPM) and the Port of Los Angeles, DPM was growing (as expected) from 2005 to 2006 but has reversed to declining emissions thereafter. The Port attributed the 71% decline in DPM since 2006 as follows:

> Port-related DPM emissions have decreased 71% since 2005. [See Figure 20.] These reductions were led by vessel speed reduction, vessel fuel switching, Alternative Maritime Power, and the Clean Truck Program, which all contributed to significant reductions in DPM emissions through 2011. [lxxiv]

The legal basis for inducing these changes relies, in part, on the Port's CEQA obligations.

[12] "Many shipping companies doing business with the ports today, such as China Shipping which has become one of the greenest companies, have successfully adapted to new regulations and technologies which include use of clean fuels, recycling and speed reduction of vessels." From Reut Cohen, "Ports Of Los Angeles And Long Beach See Reduction In Toxins Amid Health Concerns," NeonTommy, USCAnnenberg Digital News, May 20, 2011 http://www.neontommy.com/news/2011/05/ports-los-angeles-and-long-beach-see-reduction-toxins-amid-health-concerns (accessed February 15, 2013)

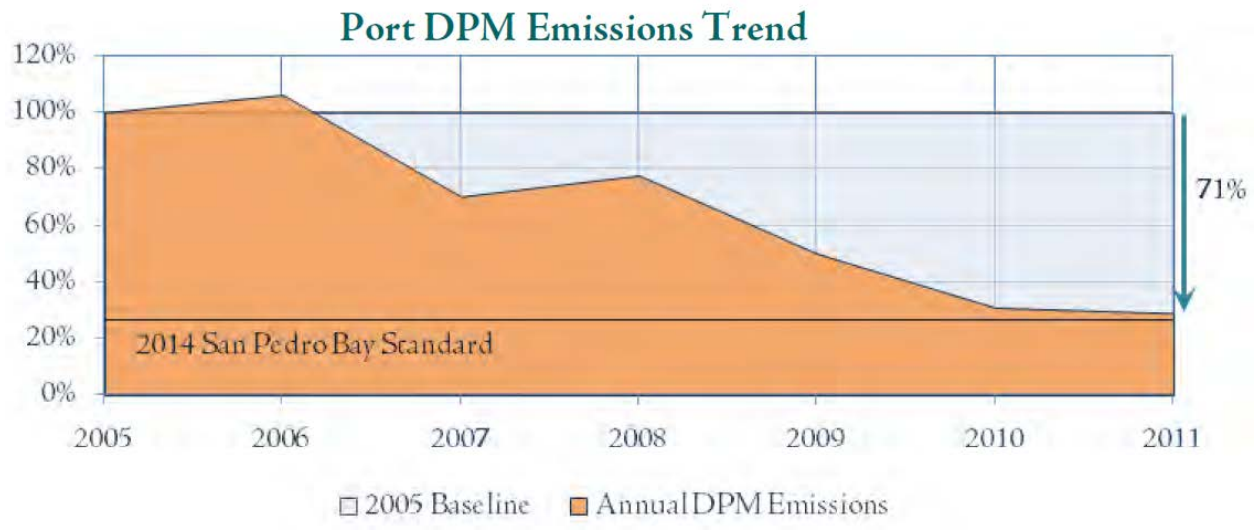

FIGURE 20: GROWTH AND DECLINE IN DIESEL PARTICULATE MATTER FROM THE PORT OF LOS ANGELES, 2005-2011 [lxxv][13]

Nitrogen oxide emissions in the Port of Los Angeles also began to fall between 2006 and 2007. The Port stated:

> Port-related NOx emissions have decreased 51% since 2005. [See Figure 21.] These reductions were led by the Clean Truck Program, CARB cargo handling equipment-related regulations, vessel speed reduction, and rail fleet modernization. [lxxvi]

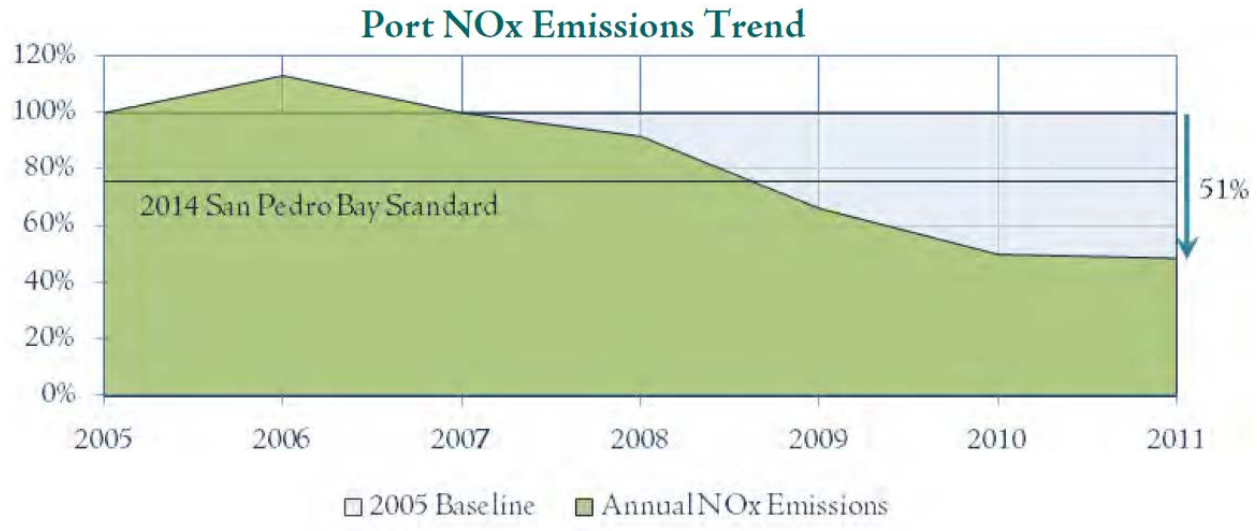

FIGURE 21: GROWTH AND DECLINE IN NITROGEN OXIDES FROM THE PORT OF LOS ANGELES, 2005-2011 [lxxvii]

Again, the legal basis for inducing these changes relies, in part, on the Port's CEQA obligations.

Sulfur dioxide emissions in the Port of Los Angeles also began to fall between 2006 and 2007. The Port stated:

> Port-related SOx emissions have decreased 76% since 2005. [See Figure 22.] These reductions were led by CARB vessel fuel switching regulation and ultra low sulfur diesel for use by on-road and off-road vehicles, vessel speed reduction, and Alternative Maritime Power. [lxxviii]

[13] The San Pedro Bay Standard refers to goals set by the 2010 revised CAAP

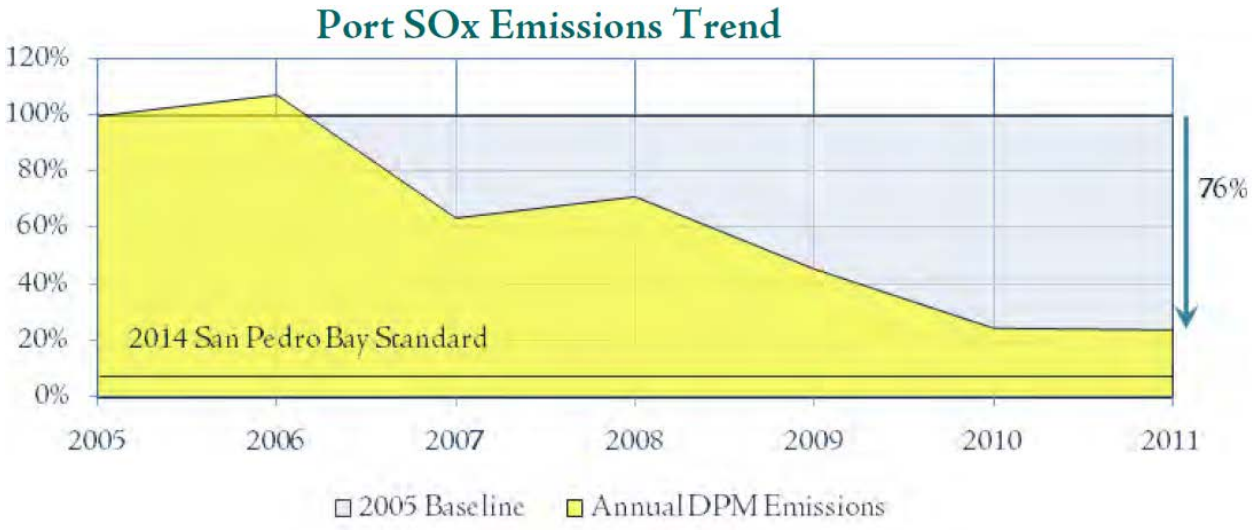

FIGURE 22: GROWTH AND DECLINE IN SULFUR DIOXIDES FROM THE PORT OF LOS ANGELES, 2005-2011[lxxix]

And again, the legal basis for inducing these changes relies, in part, on the Port's CEQA obligations.

Greenhouse gas emissions (Co2) in the Port of Los Angeles also began to fall between 2006 and 2007. The Port stated:

> Since 2005, port-related greenhouse gas emissions have also been reduced as a result of "co-benefits" from the implementation of CAAP measures, such as vessel speed reduction and Alternative Maritime PowerTM (AMP). [See Figure 23.]

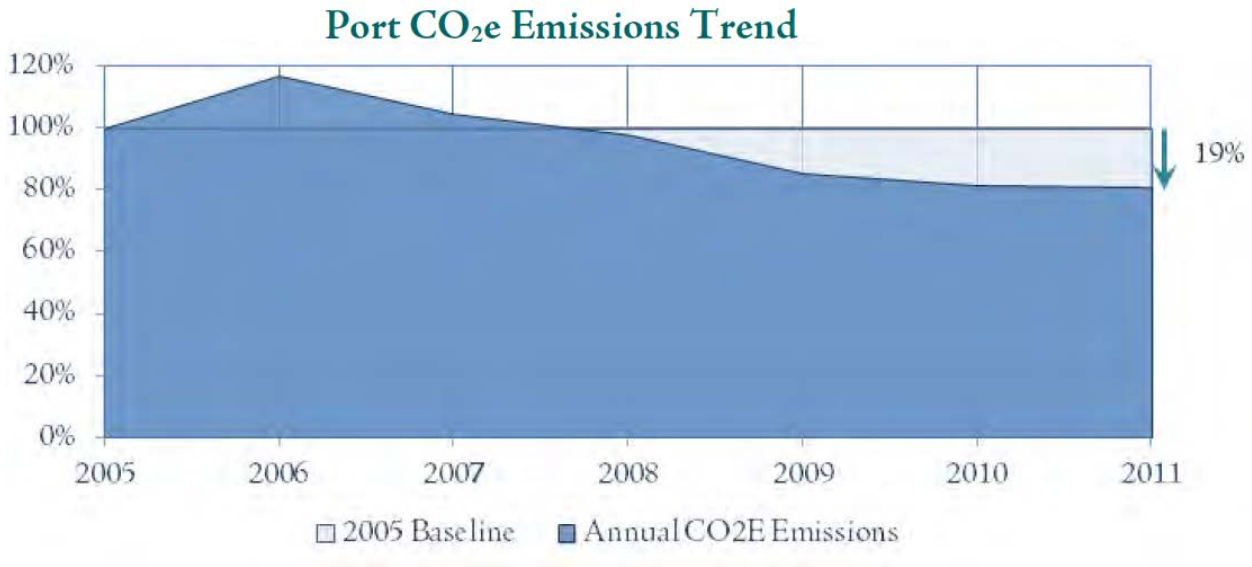

FIGURE 23: GROWTH AND DECLINE IN GREENHOUSE GAS EMISSIONS FROM THE PORT OF LOS ANGELES, 2005-2011

And again, the legal basis for inducing these changes relies, in part, on the Port's CEQA obligations.

Summarizing the Case of CEQA and Green Growth in the Ports

As the Court said in the China Shipping case:

> The CEQA process is intended to be a careful examination, fully open to the public, of the environmental consequences of a given project, covering the entire project, from start to finish. This examination is intended to provide the fullest information reasonably available upon which the decision makers and the public they serve can rely in determining whether or not to start the project at all....The EIR is intended to furnish both the road map and the environmental price tag for a project, so that the decision maker and the public both know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey. [lxxx]

This adversarial lawsuit proved to be a clarifying example of the multiple roles and benefits conferred by CEQA. CEQA allowed port communities, environmentalists and eventually even environmental regulators whose jurisdictions were fragmented and limited, into the process of envisioning port growth. This allowed new voices into the planning process. But also CEQA allowed the ports to grow green sooner. Without CEQA, green growth in the ports may well have had to wait until the hoped for but distant day wherein, as the 2010 updated CAAP stated: "international, national, state and regional regulatory agencies... [could] implement uniform requirements to reduce emissions from port operations." [lxxxi] CEQA and China Shipping meant that these two colossi of international container ports would move from dirty growth to green growth, decoupling pollution from expansion years and perhaps decades sooner than otherwise would have been the case. And perhaps even more fundamental, China Shipping provided the catalyst for a paradigm shift in the relationship between the ports and the surrounding community. It is seemingly ironic that an adversarial court case would lead to a community-port partnership, but really, that is one of the ultimate goals of the CEQA process.

Case Study 3: CEQA Intervention Leads to a Switch from Wet to Dry Cooling

As a general proposition, California has a fixed supply of fresh water. In 1979, Robert B. Haussler of the California Energy Commission wrote:

> One of the most important considerations which must be investigated when screening potential sites for a thermal electric power plant is the availability of a satisfactory water supply for cooling. Water is a critically important resource in California....A basic concern of agricultural interests and water managers is that...the projected dependable water supply of 36.4 MAF (million acre feet) may not...meet projections of water demand (36.4 MAF to 46 MAF in the year 2020)....California utilities [use] only 60,000 acre-feet (0.17%) for power plant cooling during 1977. Most power plants in California are located in coastal areas where once-through cooling with ocean or estuarine water has been feasible, and thus, only minor amounts of fresh ware are presently used. Agricultural interests suggest that new power plants should be sited on the coast...[however] coastal sites acceptable to the California Coastal Commission cannot be found. [lxxxii]

With coastal and estuarine saline water limited by siting and environmental concerns, inland power plants using traditional cooling technologies compete with agricultural and urban interests for fresh and recycled water supplies. Obviously, seasonal and annual fluctuations in weather can perturb that supply. Climate change may permanently alter California's water supply in as yet unknown ways. Better methods of collecting, tapping, piping, conserving and reusing water can change the effective supply of fresh water. But all these various techniques for altering the effective supply of fresh water have economic and environmental tradeoffs between the various competing uses of fresh water. Once a water source is committed to an electrical generating plant, that commitment may be from 30 to 50 years.

California annual electrical consumption continues to grow which could mean that natural-gas power plant demand for fresh and degraded water may grow apace depending on the technology used to cool thermal plants. Figure 24 shows that annual electrical consumption in California in 2022 is projected to be about 45% greater than it was in 1990.

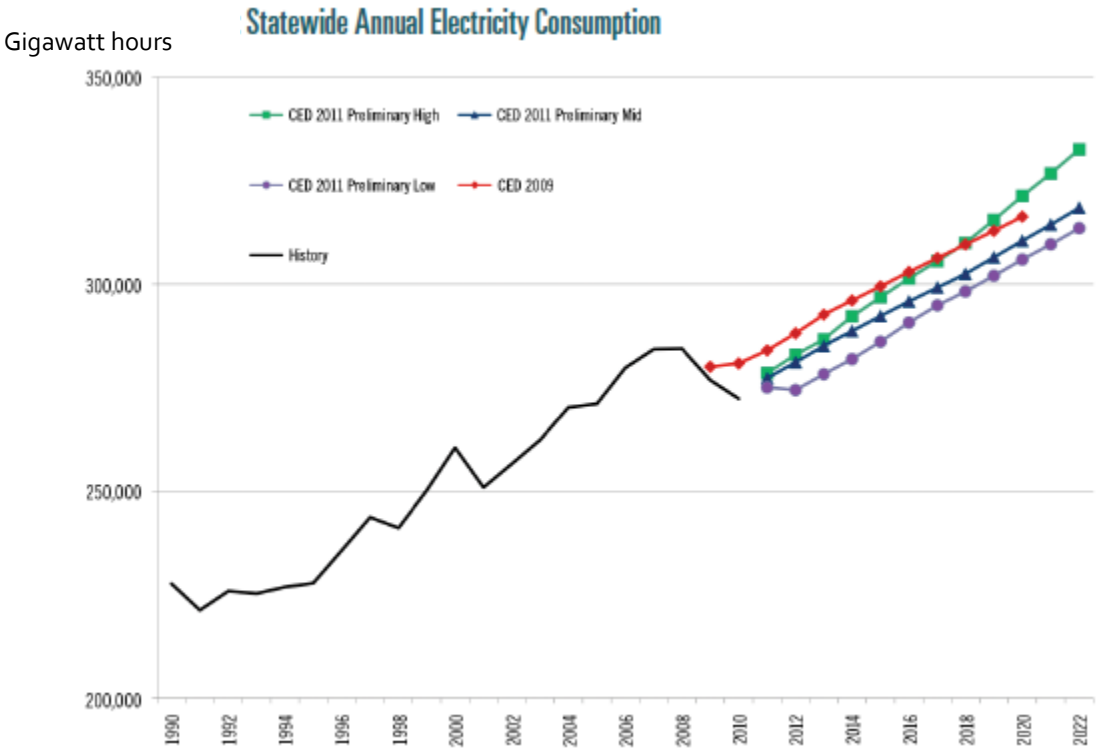

Figure 24: California statewide electricity consumption 1990 to 2011 and projections to 2022[lxxxiii]

100,000 Annual Acre-Ft. of Water Committed to Wet Cooling from 1996 to 2005

Between 1996 and 2004, California annual electricity consumption rose by about 20%. In response to this growing demand, 8404 MW of natural-gas-fueled generating capacity was brought on-line in those 8 years. Ocean or estuary water was used to cool 16% of this generating capacity while the remaining 84% was cooled by fresh or recycled or degraded inland water. This reflected the fact that many of the new natural gas plants were in inland counties such as Kern (1944 MW) San Bernardino and Riverside (1486MW) San Joaquin and Sutter (710 MW). Even more were expected inland in 2004-2005. A total of 31,376 acre feet of inland water per year had been allocated to cool these gas-powered, inland electrical generating facilities that came on line from 1996 to 2004, a commitment that will run for decades to come.[lxxxiv] An additional 66,742 acre-feet of water had been committed for plants that were under construction or permitted in 2004 or early 2005.[lxxxv] Thus, taken together, between 1996 and 2005, the CEC had permitted the new allocation of almost 100,000 acre feet of water annually for the cooling of gas-powered electrical generating facilities which were 50 MW in size or larger.[14]

[14] The CEC does not have permitting authority over power plants under 50 MW.

Across all the years prior to 1977, only 60,000 acre-feet of inland water had been allocated to wet cooling inland thermal power plants still operating in 1977. But in just 8 years between 1996 and 2004, an additional 100,000 acre feet of inland fresh and recycled water was committed. So in just 8 years, almost 1.7 times more additional inland water was committed than the total 60,000 acre feet of inland water committed across decades of licensing inland power plants. In short, the 1996 to 2004 period exposed an inland water rush to wet-cool inland natural gas power plants.[15]

The California Energy Commission stated in 2005 that part of the problem was one of time frame. Water districts thought in terms of decades while power plants gobbled up 30 to 50 year commitments.

> While [municipal] water districts…appear to be pursuing new supplies to meet their projected water demands over the next 20 years, in decades to follow the opportunities for securing additional water transfers and developing new supplies (except for the most costly supplies derived from seawater desalinization) are expected to be limited. Committing water resources for power plant cooling can be a 30 to 50 year decision; whereas, normal water supply planning horizons conducted by water districts are typically for 20 years, which may not anticipate the potential competing needs for water supplies between power plant cooling and municipal uses.[lxxxvi]

Figure 25 shows that while recycled and degraded water account for the largest share of water used to cool these plants built in 1996 to 2004, groundwater from wells and water transfers from freshwater sources are the next two most important supplies of cooling water.[16]

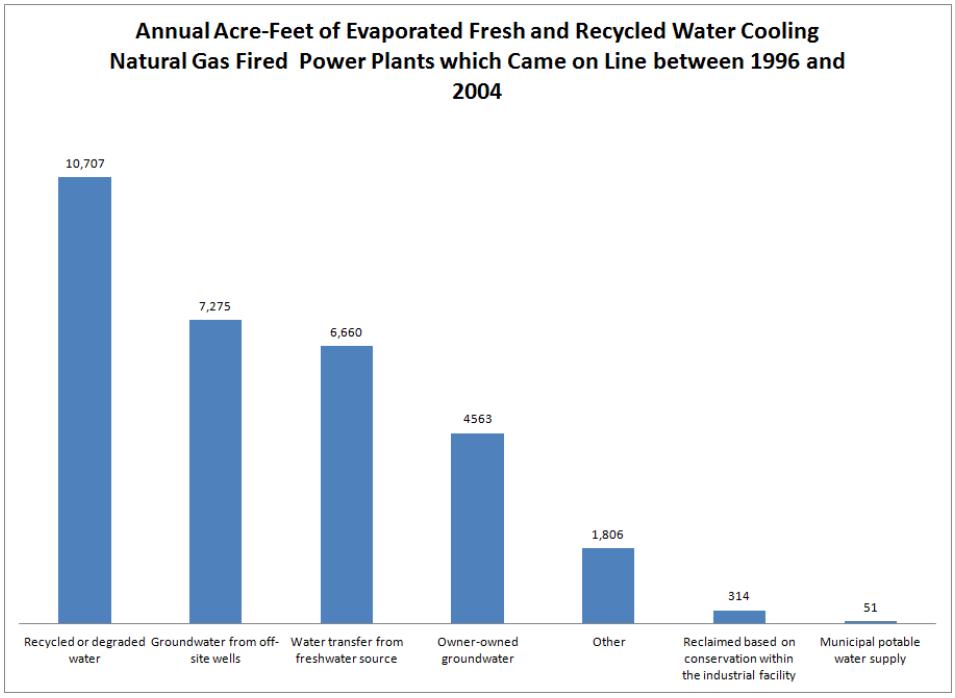

Figure 25: Annual acre feet of evaporated fresh, recycled and degraded water used to cool natural gas fired power plants brought online in California between 1996 and 2004[lxxxvii]

[15] This author could not find the inland power plant total annual water usage for 1996, but given the limited number of inland thermal power plants built between 1977 and 1996, presumably that wet-cooling water usage was not much higher than the total annual 1977 allocation.

[16] Recycled and degraded water play a larger role in cooling the plants under construction or permitted but not under construction in 2004-5 reflecting the CEC's growing aversion to licensing fresh water cooled plants after 2003. The origin of this aversion is discussed below.

A Lost and Forgotten Policy Discouraging Wet Cooling

As far back as 1975, the State Water Resources Control Board developed a policy discouraging the use of inland water resources for power plant cooling:

> There is a limited supply of inland water resources in California. Basin planning conducted by the State Board has shown that there is no available water for new allocations in some basins. Projected future water demands when compared to existing developed water supplies indicate that general fresh-water shortages will occur in many areas of the State prior to the year 2000. The use of inland waters for powerplant cooling needs to be carefully evaluated to assure proper future allocation of inland waters considering all other beneficial uses....The loss of inland waters through evaporation in powerplant cooling facilities may be considered an unreasonable use of inland waters when general shortages occur.[lxxxviii]

But this policy went unnoticed and unheeded by the California Energy Commission which was licensing all the state's thermal power plants of 50 MW or more. Indeed, the late 1990's and early 2000's was a period of rapid natural gas power plant expansion and as cited above, 84% of the new capacity was being cooled by inland water. There is a lag of several years between when a power plant is proposed and when it comes on line. After 1996 proposed inland, wet-cooled, natural gas power plants came before the CEC; most were approved, and these started to come online in the early 2000's.

One of these, the 830 MW High Desert Power Project in Victorville, California, was proposed and approved using wet cooling—using up annually 4000 acre feet water from the Sacramento-San Joaquin Delta. Another plant, in Kern County in 1998, the La Paloma natural gas power plant, proposed and was approved to use 6000 acre feet of water from the California aqueduct. With regards to the use of wet cooling and inland water supplies, these approvals were more-or-less business as usual for the California Energy Commission.

The key event was in 1997 when Calpine proposed to use groundwater for cooling the 540 MW Sutter power plant. Concerns were raised in this plant's CEQA process both regarding the use of water and the discharge of wastewater. Several parties intervened in the CEQA process raising concerns and proposing alternatives. This was a key moment because during the CEQA process, Calpine and interveners agreed to alter the plant's design to implement a dry cooling technology. Dry cooling eliminated both water usage and wastewater discharge. This then set an example that would eventually catch the eye of the CEC and lead to a 2003 policy that strongly encouraged the use of dry cooling instead of inland water, particularly fresh water. Given time lags between licensing and coming online, this CEQA catalyzed CEC policy would mean that after 2006, wet cooled plants would account for a negligible amount of the new electrical generation capacity going online in California.

The Advantages of Dry Cooling

The conventional way a natural gas fired power plant is cooled is through "wet cooling." In simple terms, wet cooling using inland water is like the radiator of a car. A cooling tower serves as the radiator. Heat absorbed by water circulating through a cooling system within the plant is released into the atmosphere through evaporation inside the cooling tower. Evaporated water must be replaced leading to water consumption through evaporation.

There is an alternative to wet cooling—dry cooling. Dry cooling is like an old Volkswagen air cooled engine where heat is transferred to the atmosphere via convection. And there is a hybrid mixture of wet and dry cooling techniques. Wet/dry hybrid systems are a variant on dry cooling where some net water loss occurs.[lxxxix] In 2002, in evaluating the pros and cons of wet, hybrid and dry cooling, the CEC stated:

> On balance, the environmental effects of dry and wet/dry [i.e. hybrid] systems are reduced in comparison to wet systems....The most important environmental effects of wet systems arise from water consumption, water and waste discharge, intake losses (entrainment or impingement), drift, and visible plumes. The use of dry cooling essentially eliminates all of these effects; wet/dry systems can be operated to eliminate the visible plume and to reduce the other effects by an amount proportional to the reduction in water consumption relative to all-wet systems.[xc]

The CEC noted in 2003:

> Alternative cooling options, such as dry cooling, are available, commercially viable, and can reduce or eliminate the need for fresh water. Two projects using dry or air cooling became operational [in California] in 1996 and 2001 [Sutter]. A third project using dry cooling in San Diego County is currently under construction.[xci]

CEQA Catalyzes a Shift to Dry Cooling

This is a story of the role CEQA played in bringing to the fore dry cooling as a preferred option in the construction of gas-fired power plants in California. We will see that CEQA in this instance helped connect disconnected state water and energy policies and catalyzed new CEC policies.

Catalyst: The Sutter Plant

The CEC staff became aware of the State Water Regional Control Board Policy 75-58 regarding the use of inland water because this became a contentious CEQA issue in the 540 MW natural gas plant proposed for Sutter County at about the same time. Calpine proposed the Sutter Power Plant Project in December, 1997 and the CEC filed its Final Staff Assessment/Draft Environmental Impact Statement in October, 1998.[xcii] Calpine's Sutter project located north of Sacramento and seven miles from Yuba City originally proposed to cool the plant with fresh water drawn from wells.[xciii] The project was on land designated for agricultural use. Local farmers, nearby neighbors, labor unions and environmentalists all intervened through CEQA raising a variety of concerns including the issue of fresh water usage for cooling and consequent wastewater discharge issues.[xciv] Through the CEQA process water-related concerns as summarized by the CEC staff included:

> Concerns have been raised about the project's wastewater discharge potentially affecting water quality in the Sutter Bypass, the Sacramento River and the Sacramento-San Joaquin Delta. These adverse effects may include: potential episodes when water quality standards may be exceeded; adverse affects on water treatment plants, related public health concerns and economic impacts on agencies and districts that rely on the Sacramento River-San Joaquin River Delta for their water supply; and cumulative impacts. We have received letters of concern from the Contra Costa Water Agency, the California Urban Water Agencies and the California Unions for Reliable Energy on this issue.[xcv]

Dry cooling would eliminate both the need for fresh water and the discharge of wastewater. These considerations resulted in a set of CEC mitigations including:

> As a result of the review process and the concerns raised by the public, Sutter County staff, Energy Commission staff, U.S. Fish and Wildlife Service, and other interested parties, Calpine provided a mitigation package that would address many of these concerns and potential environmental impacts. The following summarizes the proposed mitigation measures.

1. The Sutter Power Plant will utilize a 100% dry cooling design that will reduce groundwater use by over 95% from the original proposal of 3,000 gallons per minute to a revised annual average of less than 140 gallons per minute.
2. The dry cooled plant will be zero effluent discharge facility and not discharge any process fluids into drainage canals in the area.[xcvi] [17]

Thus, dry cooling technology met the dual concern of water usage and water discharge by effectively eliminating both.

The La Paloma Plant

In the aftermath of the passage of AB 1890 which deregulated electrical generation in California, there was a rush of applications to build large "merchant" electrical generating facilities. Among the early requests was the 1124 MW La Paloma natural gas combined cycle plant in Kern County which in August 1998 proposed to draw 6000 acre feet of water from the State Water Project California Aqueduct guaranteed by the West Kerns Valley Water District.[xcvii]

While the CEC staff was concerned about the possible interruption of water flows due to natural and/or human causes, there was no concern expressed regarding the water usage itself.[xcviii] Because of the contemporaneous Sutter proposal, the staff was aware of the State Water Regional Control Board Policy 75-58 quoted above giving in the CEC's words "priority to other lower quality water sources over the use of fresh water for power plant cooling."[xcix] However, because no intervener from the public was raising this issue in the case of La Paloma, and because the CEC staff, itself, did not push the question of using fresh cooling water, the La Paloma plant was permitted as a traditional, fresh-water, wet cooling system capturing 6000 acre feet of California Aqueduct and West Kern Valley Water District water for the life of the La Paloma plant. Approved in October, 1999, this large natural gas power plant went on line in January 2003.[c] Thus, the West Kern Water District had committed 6000 acre feet of water for as much as 50 years.

The Bridge: CEQA Gets the CEC and State Water Board Talking to Each Other

The Elk Hills Plant

While technically the CEC required Calpine's Sutter plant to use dry cooling, this was actually an agreement on Calpine's part both with CEQA interveners concerned with inland water usage and interveners concerned with pollution from water discharge.[ci] The CEC, itself, was still, in the late 1990's, doubtful regarding the soundness of dry cooling technology and hesitant to require power plants to abstain from inland water usage for wet cooling purposes. This became apparent in the dispute over dry cooling in the Elk Hills 500 MW combined cycle natural gas plant proposed in October, 1998 for Kern County 25 miles from Bakersfield.[cii] Elk Hills proposed traditional wet cooling requiring 3200 acre feet of water drawn from offsite groundwater wells.[ciii]

In the Elk Hills application, California Unions for Reliable Energy (CURE) intervened and midway through the CEQA process raised the issue of inland water usage before the California Energy Commission citing the California State Water Resources Control Board policy 75-58 mentioned above namely that "The use of inland waters for powerplant cooling needs to be

[17] Two other key mitigations not involving water usage were

1. Calpine is prepared to re-route the transmission line down South Township and west on O'Banion to a switchyard site on the south side of O'Banion Road near the Sutter Bypass.
2. Calpine proposes to further reduce emissions from the plant to 2.5 parts per million (ppm) nitrogen oxide (NOx).

carefully evaluated to assure proper future allocation of inland waters considering all other beneficial uses." The applicant for the Elk Hills power plant license complained that this issue was not raised in a timely fashion.[civ] And the applicant further opined that the policy was not germane because the West Kern Water District had adequate supplies with its existing allocation and no new allocation of water was required.[cv] The CEC staff sought guidance from the State Water Board and received the following email from a Water Board attorney:

> ...the State Water Board will approve the use of inland waters for powerplant cooling only when it is demonstrated that the use of other water sources or cooling methods would be environmentally undesirable or economically unsound.... I would agree with you that to demonstrate economic unsoundness, it would probably not be necessary to show economic infeasibility. According to a State Water Board economist, economically unsound is a subjective term that is not used by Economists. It implies some kind of balancing of costs and benefits, which are not identified in the State Water Board's policy.... I could not come across an order, as I said, in which--discussing the policy, so it does not appear that it's been applied very much.... [However] It is still in effect and applicable to all state agencies under Water Code section 13146.[cvi]

So the Water Board has a 20+ year old policy that the CEC was only becoming aware of and the Water Board, itself, had not implemented very often if at all. The Commission decided that:

> The evidence of record establishes that the Elk Hills Power Project s water supply requirements will not adversely affect WKWD's ability to supply existing customers, or likely curtail its ability to meet future demands considering WKWD's: • entitlement to SWP water; • banked groundwater; and • its ability to buy interruptible water. Furthermore, we do not believe that the use of banked groundwater will create any significant adverse impacts which would be avoided by an application of dry or wet/dry cooling. We are not persuaded, moreover, that SWRCBR 75-58 has any application to this case, other than as non-binding policy guidance....

So the Commission was going to let Elk Hills go ahead using fresh-water wet-cooling. But the Commission also said:

> It is fully apparent to us that the SWRCB had CEQA and the Energy Commission in mind when it framed SWRCBR 75-58....

This is code: the Commission was acknowledging that the Water Board was advising and encouraging the CEC and relying upon the CEQA process to transmit that advice and encouragement. And CEQA interveners in the Elk Hill case were effectively making the link between the Water Board and the Energy Commission. This got the CEC's attention and they said:

> [O]ur review of the relevant statutes reveals a common thread. The use of potable domestic water in California is disfavored. In some instances there must be an economic feasibility or cost analysis performed before potable domestic water may be used for power plant cooling. The question of what constitutes reasonable costs is, of course, best suited to the factfinder.[cvii]

So the Elk Hills project went forward using conventional wet cooling. The 500 MW Elk Hills power plant has and will continue to draw 3200 acre feet of groundwater from wells in the Central Valley for the foreseeable future. But a seed was planted in this CEQA hearing that would sprout into a new CEC policy in just a few years.

The seed was the Sutter project described above which would go ahead with dry cooling. This would help demonstrate the economic "soundness" of this technology in California—a key economic and conceptual issue at stake in Elk Hills. As the reader has seen, the Commission worried about the meaning of economic "soundness" or "feasibility" and with an operating power plant using dry cooling it would become easier for a factfinder to find dry-cooling technology constituting a reasonable cost.

In addition, in reviewing state statutes and policies stimulated by their introduction through CEQA to the State Water Board's inland water policy, the Commission came to explicitly acknowledge a common thread—"the use of domestic water in California is disfavored." Thus, facing a plethora of inland merchant power plant proposals promising a growing demand for inland water, the California Energy Commission began to reconsider the arguments raised by the public through the CEQA process that persuaded it to permit Elk Hills.

Other plants would be proposed; and in the CEQA process, the issue of inland water and particularly fresh water wet cooling would be disputed. The Commission asked for an analysis of competing cooling technologies which came out in 2002 in the report "Comparison of Alternate Cooling Technologies for California Power Plants: Economic, Environmental and Other Tradeoffs."[cviii] In 2003, the Commission's Integrated Energy Policy Report included a policy where fresh water wet cooling would only be approved when alternative water supplies and alternative cooling technologies could be shown to be environmentally undesirable and economically unsound. The CEC summarized this evolutionary change in policy in 2005:

> As noted in the 2001 and 2003 Environmental Performance Reports, there has been a shift to build power plants in the inland areas and this trend has necessitated the use of new cooling water supplies and cooling technologies. As both reports stated, there is an increased supply of reclaimed water and there are viable and commercially available alternative cooling methods that can reduce or eliminate the need for fresh water (e.g. dry cooling and hybrid cooling). To reduce the amount of wastewater discharge, both reports discussed the positive trend towards zero liquid discharge systems at power plants. As part of the 2003 Integrated Energy Policy Report, the conservation of fresh water and zero liquid discharge were developed into policy, which is referred to in this report as the 2003 IEPR Water Conservation Policy. The Energy Commission's policy states that it will not approve use of fresh water at power plants and will require wastewater reuse through zero-liquid discharge technologies unless such technologies are shown to be "environmentally undesirable" or "economically unsound".[cix]

Paradigm Shift: Dry Cooling Saves 200,000 Acre Feet of Water Over 20 Years

As the CEC stated in its Elk Hills decision: "It is fully apparent to us that the SWRCB had CEQA and the Energy Commission in mind when it framed SWRCBR 75-58." And indeed CEQA played a communicative and catalytic role in this policy change. CEQA brought the Water Board's policy to the Commission's attention. Members of the public using CEQA also brought dry cooling and hybrid cooling technologies to the Commission's attention. By stimulating the Sutter power plant to use dry cooling, CEQA created the needed real world example that could show the technology could be economically sound in California. And as we shall see below, the result of this catalyzed change was that virtually no additional inland fresh water would be used to cool power plants in California after 2004. And Figure 26 indicates that this is unique to California with the rest of the U.S. remaining reliant upon wet cooling with inland water to cool newly built electrical generators. Figure 26 shows that for power plants in operation in 2009-2010, excluding shore line plants reliant upon ocean or estuary water, those power plants outside of California that came on line before 2006 relied upon wet cooling. Benchmarking against kilowatts of summer generating capacity, those inland plants in California in a similar fashion also relied upon wet cooling. From 2006 to 2010, new plants coming on line outside of California continued to rely upon wet cooling while in California, wet cooling becomes the marked exception and dry cooling takes over.

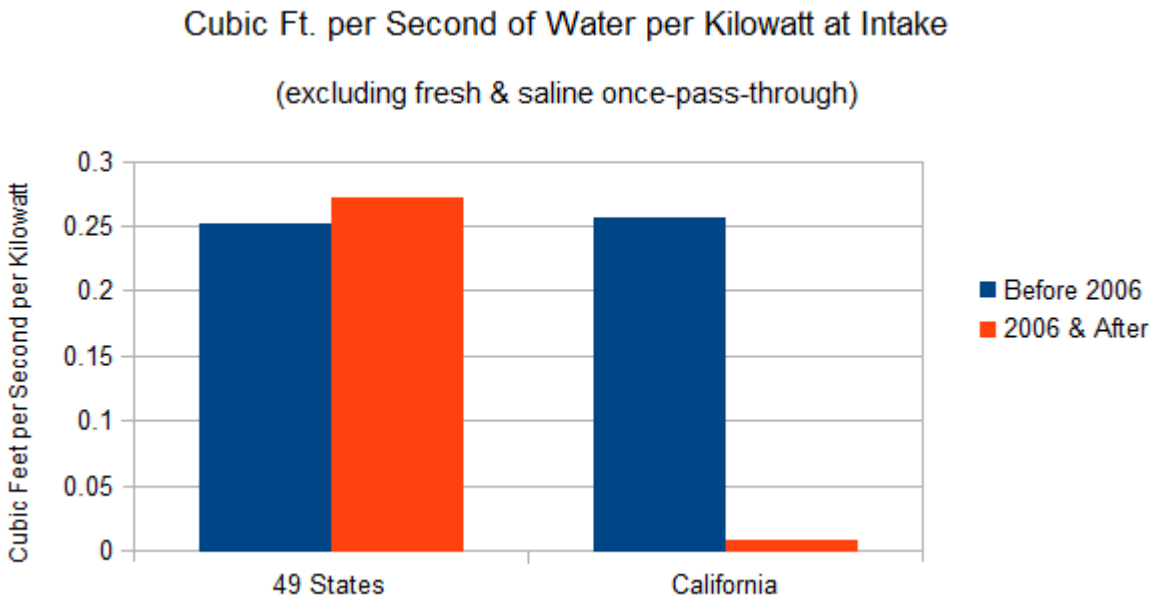

FIGURE 26: CUBIC FEET OF WATER PER SECOND AT INTAKE PER KILOWATT OF NEWLY ON LINE GENERATING CAPACITY BEFORE AND AFTER 2006, CALIFORNIA COMPARED TO 49 STATES [cx]

As discussed above, over the 10 years from 1995 to early 2005, the CEC had granted licenses for gas fueled, inland power plants thereby committing almost 100,000 acre feet annually in inland water to cool these facilities. Both fresh and recycled or degraded water were committed with recycled and degraded water having the highest share. Going forward, over the next 10 years or so, there will be an expansion of utility scale renewable energy electrical generation capacity from solar, wind and geothermal sources to meet California's 33% renewable energy portfolio. Probably photovoltaic electrical generation will predominate new power plant construction in the near run as utilities seek to meet their mandated renewable portfolio goals.[18] Natural gas will continue to be significant as utilities seek to complement their renewable energy generation which fluctuates with wind and sun with controllable natural gas generation. This conjecture is based on the following assumptions:

- Over the next several decades as older out-of-state coal plants and in-state nuclear plants are decommissioned and not replaced, electrical generation from these energy sources will decline as a share of overall electrical generation in California.
- Hydroelectric, wind and geothermal share of electrical generation will hold constant or perhaps shrink some as the finite number of locations for these facilities are fully developed.
- The share of natural gas electrical generation using ocean and estuary water will hold constant or decline because available sites are limited and as older plants using these waters are decommissioned, they may not be replaced.
- No new technology, such as ocean wave generated electricity, will rise to significant levels of importance.
- Natural gas prices will continue to be relatively favorable compared to other types of electrical generation.

[18] Established in 2002 and accelerated in 2006 and 2011, California's renewable portfolio standard requires that investor owned utilities procure 33% of their power from renewable sources by 2020… Currently, the three largest investor owned utilities, Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric are each at about 20% or almost two-thirds the way to their mandated goal. California Public Utilities Commission, California Renewables Portfolio Standard, http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm (accessed February 19, 2013)

- While conservation may decrease per capita electrical demand in California, population growth will drive demand up in a pattern similar to the last 20 years. (See Figure 24)
- California regulations will not require an increase in renewable—primarily photovoltaic solar—utility-scale generation above the currently mandated 33% of total capacity.
    - Regarding this last assumption, some political observers believe that renewable mandates will rise significantly over the next decade. Even if this alternative perspective is true, natural gas will nonetheless remain the most important complementary energy source to renewable energy for the foreseeable future.

But assuming the foregoing are true, over the long run, from now to 2050, had wet cooling of natural gas electrical generation continued in California the way it does continue in the other 49 states, California would have had to allocate towards power plant cooling about an additional 10,000 acre feet of inland water per year. The most precious of this water hypothetically lost water to wet-cooling would have been fresh water. However, most of that water lost to wet-cooling would have been recycled or degraded water.

But even recycled water depending upon its qualities has a variety of competing uses including food crops, parks and school yards, golf courses, cemeteries, freeway landscaping, etc.[cxi] Over a 20 year period, say between 2015 and 2035, the CEC's strong discouragement of wet cooling catalyzed by interveners in a CEQA process will save annually in California by 2035 about 200,000 acre feet of fresh and recycled inland water. This water will be available from a relatively fixed supply to meet alternative demands as California grows and prospers. And even if California's renewable portfolio for utilities increases to (say) 50%, natural gas facilities will remain the complementary choice for replacing and expanding generating capacity. This means that the switch to dry cooling will continue to have a lasting impact on California's access to scarce water resources.

Summarizing the Case of CEQA and Dry Cooling

After electricity deregulation in 1996, there was a boom in merchant natural gas power plant proposals, and 86% of this new generating capacity was planned for inland sites. Following standard approaches, these newly proposed plants envisioned wet cooling using inland water, most of which was recycled but much of which was fresh. Operators proposed drawing from local water districts, wells, various water transfers and recycled water sources. The California Energy Commission saw little wrong with these water sources until issues of inland water tradeoffs, wastewater discharge problems and old, forgotten but not off-the-books Water Board policies discouraging the use of inland water to cool power plants were all brought to the CECs attention by CEQA interveners. In the Sutter Plant case, a side agreement between Calpine, the applicant, and interveners concerned with wet cooling and/or wastewater discharge, created a dry cooling alternative. The Commission went along with that agreement. However, in the parallel case of Elk Hills, the Commission was less than impressed with dry cooling as a technology, the Water Board's policy discouraging inland water usage as binding, and the economic soundness of moving away from standard wet cooling. Had CEQA not led to dry cooling at the Sutter plant, the ball may never have started to move towards dry cooling. But Sutter dispelled concerns regarding the technical novelty and the economic soundness of dry cooling. The Commission, in trying to sort out the meaning and reach of the State Water Board's inland water policy came to the awareness that there was a widespread view in California policy discouraging wet cooling with inland water. Furthermore, the Commission began thinking about the disconnect between the Commission approving 30 to 50 year commitments to a set amount of inland water with water districts typically planning out their water allocations over shorter time periods. Cogitating these issues, the Commission sponsored a study examining the relative advantages of wet vs. dry cooling. With that study in hand, the Commission moved to a better-safe-than-sorry policy of not permitting wet cooling with inland waters, particularly fresh water, unless it could be shown that dry cooling was environmentally more harmful and economically unsound. In effect, this releases

about new 10,000 acre feet of water per year to be available for alternative uses instead of being committed to newly operational gas-fired power plants.

None of this would have happened or happened as soon without CEQA. As the CEC stated, the State Water Board may well have had CEQA in mind as a mode to move its policy discouraging inland water power plant cooling to consideration in CEC power plant licensing. Whether the Water Board had this in mind or not, that is exactly how the CEC came to be aware of this issue. Here again, CEQA has played a role in unifying fragmented jurisdictions. And in this case, CEQA has played a further role in informing rule makers of new, relevant technologies and leading the CEC to look beyond specific water supplies to view California inland water issues holistically. As a unifier and catalyst, CEQA intervention in the case of wet cooling has saved substantial amounts of inland water for alternative uses and pushed water considerations onto a broader plane while enabling fragmented state regulators to better remember, communicate and consider water policies and issues jointly.

Conclusions

CEQA and the Economy

There is no evidence at an aggregate level that CEQA, enacted in 1970, has subsequently hobbled the California economy. With the exception of the 1990 and 2008 recessions where California was hit harder than the rest of the U.S. economy, California's per capita GDP has grown faster since CEQA's enactment compared to the rest of the U.S. and California's per capita GDP grew faster since 1970 than it did in the 1960s, the earliest years for which we have data.

Residential housing construction has tracked California population changes since the early 1960s, and there is no sign that this tracking in tandem was weakened by the enactment of CEQA.

California's share of U.S. manufacturing output while stable in the 1960s has grown dramatically since CEQA was passed in 1970. The underlying reasons for this shift have to do with California's leadership in high tech, bio tech, medical, pharmaceutical and other industries dependent upon professional labor. California's growing leadership in U.S. manufacturing also is related to the coincident decline of heavy manufacturing in the rust belt dependent upon blue collar labor. California's advantage in professional-dependent research, development and manufacturing has much to do with the excellent system of public and private higher education in California but it also is related to the attractive lifestyle California can offer professionals and others. CEQA has a hand in this success by helping California retain and improve its environment in the face of manufacturing and economic growth.

Construction activity is in the bulls-eye of CEQA oversight. Large construction projects of all kinds are often subject to CEQA review. Through the lens of construction employment we can compare 30 years of California construction activity before CEQA with 40 years after CEQA benchmarking this before-and-after comparison against construction performance elsewhere in the U.S. California's share of U.S. construction employment peaked in 1943 at around 12% during the war-related industrial and housing building boom in California. Not surprisingly, California construction employment as a percent of U.S. construction employment fell after World War II and took another step down in the 1960s. But after CEQA was passed, California's share of U.S. construction employment rose, dipped with each major recession but rose again until by 2006, California's share of U.S. construction employment was higher than even during World War II. The Great Recession has pummeled California construction, but even at the bottom, California's share of U.S. construction

employment is two percentage points higher than it was when CEQA was enacted. The conclusion here is that CEQA has not slowed overall California construction.

And disaggregated numbers for the building of energy generation facilities confirm this conclusion. Power plant construction boomed in both California and the rest of the U.S. in this decade. U.S. Energy Information Administration data tracking the cancellation of proposed power plants shows that the rate of cancellation was 3 times higher for proposed power plants outside of California compared to within the state. In the last few years there has been a boom in utility-scale solar electrical generation facilities. In 2013, by megawatt, California had 36% of all the operating U.S. solar power stations and California accounted for 77% of the solar plants under construction. In California, these solar-powered generation plants must go through CEQA processes. Clearly, CEQA is not gumming up the rush to build solar.

CEQA and the Environment

As quoted above, the California Environmental Quality Act is about process:

> The CEQA process is intended to be a careful examination, fully open to the public, of the environmental consequences of a given project, covering the entire project, from start to finish. This examination is intended to provide the fullest information reasonably available upon which the decision makers and the public they serve can rely in determining whether or not to start the project at all…The EIR is intended to furnish both the road map and the environmental price tag for a project, so that the decision maker and the public both know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey.

But CEQA is more than process: it holds the potential for catalytic change. In the case of wet cooling, in 1998, CEQA interveners provided fuller information regarding power plant cooling allowing CEC decision makers to consider dry cooling technology that was not provided either by the power plant developer nor the CEC staff, itself. CEQA was also a catalyst for change with interveners in 2003 inducing the LA and Long Beach ports to introduce cold ironing and other novel technologies designed to plug ship-side electricity to land-side generation effectively eliminating the dirty diesel shipboard electrical generation while in port.

But CEQA is more than a catalyst for regulatory or policy changes. CEQA helps unify policy oversight of the environment. In the case of the Long Beach and Los Angeles ports, CEQA provided one legal foundation for the ports in developing a comprehensive and coherent approach to reducing port pollution in the face of competing, fragmented and frustrated international, national, state and local environmental regulators.

In the case of wet versus dry cooling of natural gas power plants, CEQA intervention provided the communication link between the California Energy Commission and the State Water Board bridging a neglected and forgotten policy on inland water with the process of licensing power plants.

In the case study of coal-fired power plants proposed in the late 1970s and early 1980s by PG&E and Southern California Edison, CEQA played a role in identifying the relative environmental costs of this dirtiest of electrical generation facilities. Resistance to coal-fired plants from traditional environmental groups and non-traditional groups in specific instances such as the Air Force along with adverse economic conditions helped convince these two utilities to lead the nation in switching their emphasis to non-traditional and renewable sources of electrical energy generation. Thus, CEQA helped in an eventual paradigm change leading to the early 2000's state mandate to source 33% of electrical generation from renewable sources by 2020.

Thus, CEQA is more than a catalyst for change and a mode for unifying fragmented environmental jurisdictions. CEQA is a means for injecting broader perspectives into the environmental regulatory process. For instance, in the case of wet vs. dry cooling, CEQA intervention induced the CEC to consider the broad panoply of California regulations and policies across a range of state agencies leading to CEC's recognition that "our review of the relevant statutes reveals a common thread. The use of potable domestic water in California is disfavored."

CEQA also helped the CEC staff to recognize the disconnect between the time frame in which water districts anticipate competing water demands and supplies and the time commitments regarding water usage inherent in permitting power plants. Recognizing that local water planners tend to look out 10 to 20 years while the CEC was licensing power plants that would operate for 30 to 50 years helped CEC staff recognize the importance of approaching wet cooling with inland water from a better-safe-than-sorry perspective.

Thus, CEQA intervention in the seemingly obscure issue of a neglected Water Board policy led the CEC to draw its roadmap of the environmental impact of wet cooling from a higher altitude. This new perspective allowed "the decision maker and the public both [to better] know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey." So CEQA is more than a catalyst for regulatory change. CEQA is more than a unifying thread across fragmented regulatory jurisdictions. CEQA is a shifter of paradigms. CEQA helped shift the paradigm from coal and oil to natural gas power generation. CEQA helped shift the paradigm from community port antagonism in the face of dirty growth to community port cooperation in the commitment to green growth. CEQA helped shift the paradigm from wet cooling with inland water to dry cooling with no wastewater discharge in a way the rest of the U.S. has yet to follow. Through granting the public standing in the permitting process, CEQA provides needed perspective that otherwise goes missing: that CEQA perspective has the capability of creating paradigmatic shifts in the ways California's environment is shaped and regulated.

And aggregate, long term environmental data indicate that what California is doing is working. With the help of CEQA interveners, new coal and oil fueled electrical generation has been eliminated in California since as far back as 1980 with it being replaced by inherently cleaner natural gas and renewable energy electrical generation. LA and Long Beach port emissions are falling when prior to the 2002 CEQA intervention they were rising with no end in sight. California is saving about 200,000 acre feet of water, annually, by 2035 through the switch to dry cooling of natural gas power plants. More generally, stationary emissions in California are improving more than stationary emissions nationally or mobile emissions in California. Because stationary emissions typically involve the construction of industrial, chemical, power and refining facilities and these facilities typically go through a CEQA process, where CEQA is most commonly found, pollution is best being abated. Local air districts and other regulatory bodies can take equal credit for this success, but CEQA is an integral part of this joint achievement.

Informed Decisions Means Robust Growth

Ultimately this is a story of California having its cake and eating it too. California has experienced robust, green growth over the last 40 years compared to other states in the U.S. CEQA has been an integral part of that process. From an economic perspective, this all makes good sense. CEQA is a means whereby the environmental price tag for projects is better calculated and considered as part of the overall price of development. Calculating true environmental and market costs is a more rational way of choosing how to allocate resources leading to greater efficiency. This is an economist's way of restating the previous conclusion that CEQA allows for drawing the map of a project from a higher perspective. Again:

> The EIR is intended to furnish both the road map and the environmental price tag for a project, so that the decision maker and the public both know, before the journey begins, just where the journey will lead, and how much they--and the environment--will have to give up in order to take that journey.

This is not only a good idea: it's smart. The environment and the economy are not tradeoffs. They are, in fact, an interdependent and integrated single entity.

CEQA helps place more accurate price tags on the components within California's environment/economy by enlisting the contributions of regulators, developers, stakeholders and the public in identifying the environmental costs that may elide direct market prices. So at the micro level, CEQA focuses on tradeoffs; but at the macro level, by creating a more comprehensive and meaning set or price tags, CEQA makes California economic development more efficient and in the long run, more robust. CEQA negates the misconception that the environment and the economy are tradeoffs and helps create the reality that in California, the environment and the economy are the two legs upon which California climbs the ladder of prosperity.

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[iv] California's population as a share of U.S. population since 1930 grew slowly during the Great Depression and then very rapidly during World War II. The 1950s and early 1960s saw a rapid increase in California's share of the U.S. population but this growth in share slowed measurably from the middle 1960s (before CEQA's enactment) until the middle 1970s. From the middle 1970s to 1990, California's share of U.S. population again grew fairly rapidly. But since the recession of 1990, while California's population continues to grow, California's share of overall U.S. population has stabilized. Nothing in these patterns suggests that CEQA has slowed California population growth or California's share of U.S. population.
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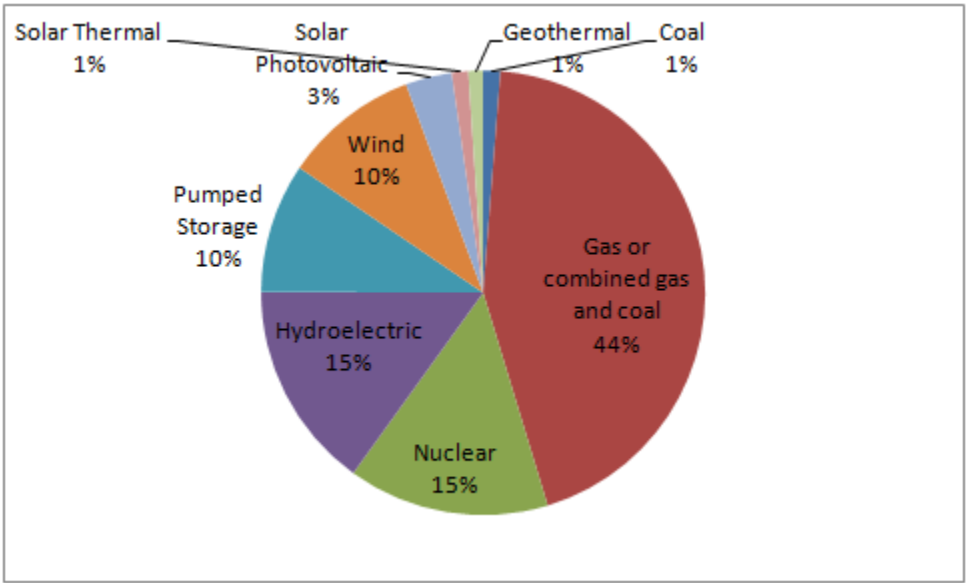
c) Mark Fulton, et al., "Comparing Life-Cycle Greenhouse Gas Emissions from Natural Gas and Coal," August 25, 2011, Worldwatch Institute, http://www.worldwatch.org/system/files/pdf/Natural_Gas_LCA_Update_082511.pdf (accessed January 14, 2012) "...on average, U.S. natural gas-fired electricity generation still emitted 47 percent less GHGs [greenhouse gases] than coal from source to use...".

[xviii] The EIA data used in this section to compare California with the rest of the U.S. includes industrial electrical generation as well as utility electrical power generation. When the data are limited to utility-based power plants only, currently, the relative role of natural gas is less, 44% vs. 63%, and the relative role of nuclear power is greater, 15% vs. 6% indicating that industrial electrical power generation is more likely to use natural gas generators and not likely to build their own nuclear power plant.



The following is a list of the current operating utility-based power plants in California. The listed solar voltaic plants, however, are currently under construction. Wikipedia, "List of power stations in California," http://en.wikipedia.org/wiki/List_of_power_stations_in_California (accessed February 26 2013)

Coal	Location	MW Capacity
ACE Cogeneration Facility	Trona, Inyo County, California	108
Argus Cogeneration Plant	Trona, Inyo County, California	55
Port of Stockton District Energy Facility	Stockton, California	54

Rio Bravo Jasmin Power Plant	Bakersfield, California	38.2
Rio Bravo Poso Power Plant	Bakersfield, California	38.2
Stockton Cogeneration Facility	Stockton, California	60
TXI Riverside Cement Power House	Oro Grande, California	24
Total coal capacity		**377.4**

Nuclear	Location	MW Capacity
Diablo Canyon Power Plant	San Luis Obispo County	2,240
San Onofre Nuclear Generating Station	San Diego County, California	2,150
Humboldt Bay power plant (unit 3)	Humboldt Bay, California	65
Total nuclear capacity		**4,455**

Gas or combined gas and coal	Location	MW Capacity
AES Alamitos LLC Gas Power Plant	Long Beach, California	1,997
Gateway Generating Station	Antioch, California	581
Haynes Gas Power Plant	Long Beach, California	1,581
Humboldt Bay Power Plant (unit one and two)	Humboldt Bay, California	154
Moss Landing Power Plant	Moss Landing, California	2,529
Ormond Beach Gas Power Plant	Oxnard, California	1,516
Otay Mesa Energy Center	Otay Mesa, California	510
Pittsburg Power Gas Power Plant	Pittsburg, California	1,311
AES Redondo LLC Gas Power Plant	Redondo, California	1,310
Russell City Energy Center (under construction)	Hayward, California	691
Huntington Beach Gas Power Plant	Huntington Beach, California	888
Tracy Power Plant	Tracy, CA	341
Total gas capacity		**13,409**

Hydroelectric	Location	MW Capacity
Shasta Dam	Redding	676
Oroville Dam	Oroville	645
Lake Almanor Dam	Canyondam	597
O'Shaughnessy Dam	Yosemite National Park	500
New Bullards Bar Dam	Dobbins	315

New Melones Dam	Jamestown	300
New Don Pedro Dam	La Grange	203
Folsom Dam	El Dorado Hills	199
Mammoth Pool Dam	Sierra National Forest	190
Spring Creek Powerplant*	Keswick	180
Pine Flat Dam	Piedra	165
Judge Francis Carr Powerhouse*	Whiskeytown	154
Trinity Dam	Weaverville	140
Parker Dam	Bluewater	120
Keswick Dam	Redding	117
New Exchequer Dam	Merced Falls	94.5
Indian Valley Dam	Lake County	3.7
Total hydroelectic capacity		**4599.2**

Pumped Storage	Location	MW Capacity
Castaic Power Plant	Angeles National Forest	1,247
Helms Power Plant	Fresno County	1,200
San Luis Dam	Los Banos	424
Total pumped storage capacity		**2,871**

Wind	Location	MW Capacity
Alta Wind Energy Center*	Kern County	800
Tehachapi Pass Wind Farm	Tehachapi Mountains	705
San Gorgonio Pass Wind Farm	White Water	615
Altamont Pass Wind Farm	Livermore	576
Shiloh Wind Power Plant	Bird's Landing	300
Total wind capacity		**2996**

Solar Photovoltaic	Location	MW Capacity
Topaz Solar Farm		550
California Valley Solar Ranch	Carrizo Plain	250
AV Solar Ranch One	Mojave Desert	230
Total solar photovoltaic capacity		**1030**

Solar Thermal	Location	MW Capacity
Solar Energy Generating Systems	Mojave Desert	354
Kimberlina Solar Thermal Energy Plant	Bakersfield, California	5
Sierra SunTower	Lancaster, California	5
Total solar thermal capacity		**364**

Geothermal	Location	MW Capacity
Calenergy	Calipatria, California	327
Total Geothermal capacity		**327**

[xix] Source: U.S. Energy Information Administration, "Electricity, Detailed State Data, Annual data for 2011," Released October 2, 2012, Existing Nameplate and Net Summer Capacity by Energy Source, Producer Type and State (EIA-860), 1990-2011, http://www.eia.gov/electricity/data/state/ (accessed January 13, 2013).

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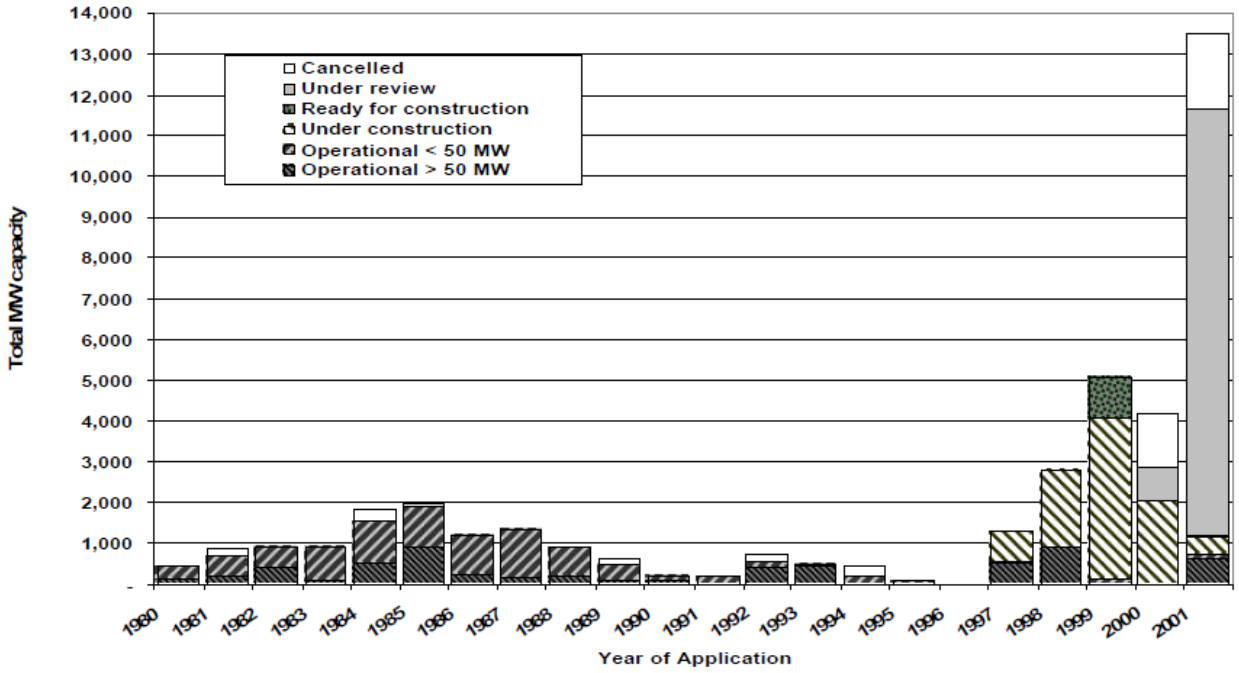
[xxii] Sweeny provides the following figure showing cancelled, under-review, ready-for-construction and operational power plants in California 1980 to 2001. The increase in proposed new plants after 1996 is consistent with the argument that the 1996 AB 1890 deregulation while probably contributing to the brown-outs of 2000-2001 also contributed to the California power plant building boom that begins in the late 1990's and continued through the 2001-2011 period (as shown in Figure 11 and Figure 12). CEQA remained in effect before and after the reforms of AB 1890, suggesting that CEQA was not the source of the logjam released in the power plant building boom of the post 1996 period.



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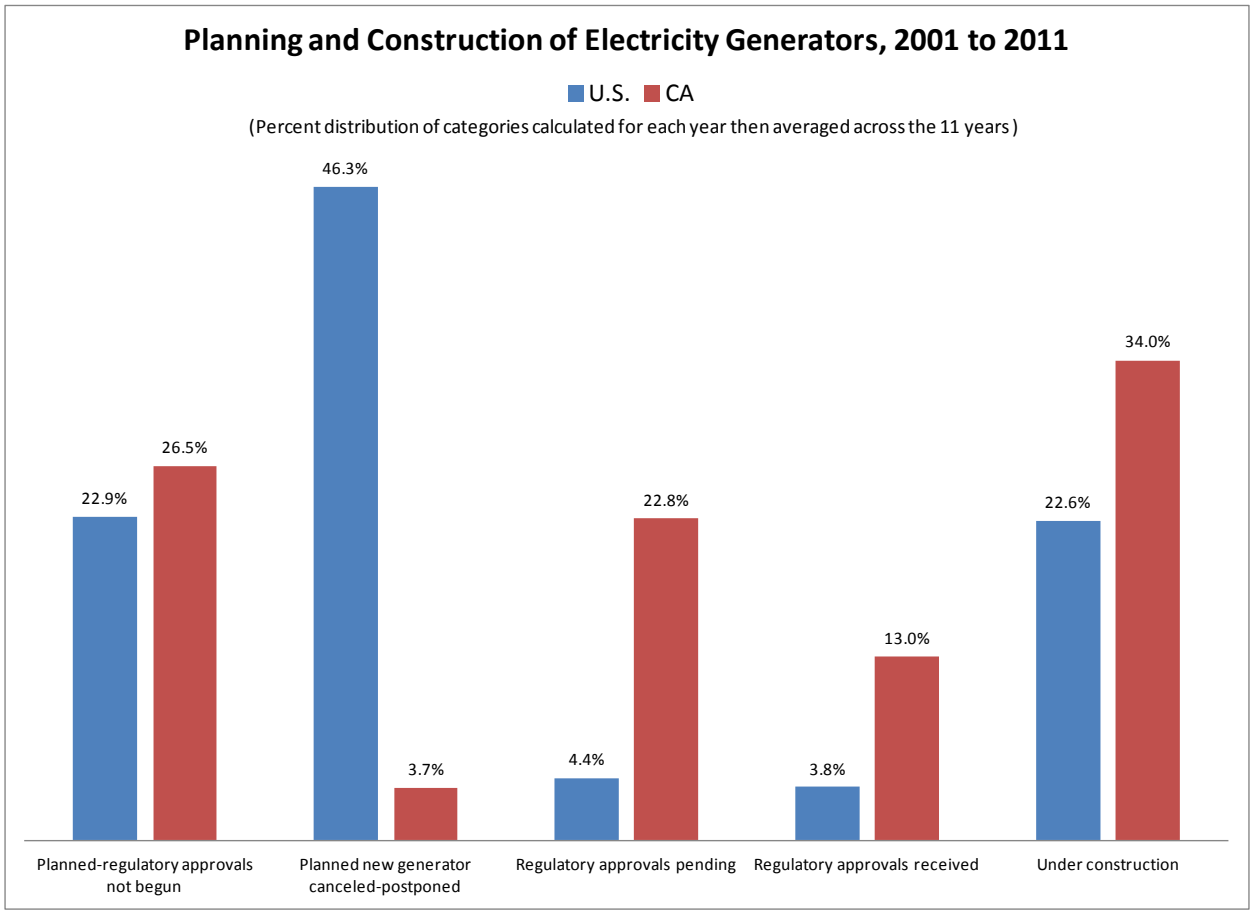
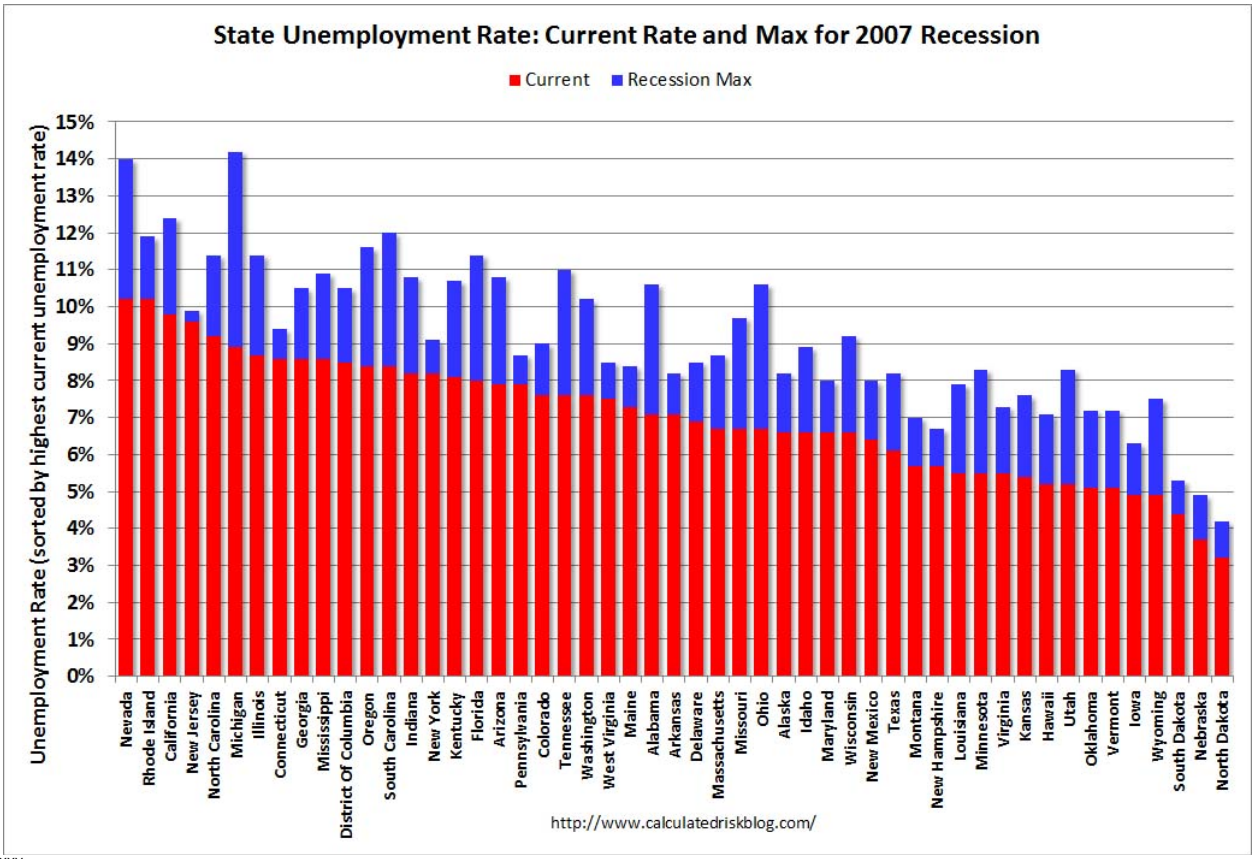
[xxiii] Percentages in the chart discussed in the text were calculated by summing projects by category across the 11 years, and then calculating the percent distribution of these various stages of planning, permitting and construction. A reasonable alternative calculation is to calculate the percent distribution of categories each year and then averaging these percentages across the 11 years. In that calculation, the relative importance of planned projects whose regulatory approval process has not begun increases and the planned new generators that have been cancelled or indefinitely postponed declines. The results of that way of calculating the average annual relative distribution between planned, permitted, cancelled and being built is as follows:



Calculating the relative distribution by summing planned, permitted, built and cancelled nameplate capacity leads to results similar to the chart presented in the text. Note: the category "under construction" includes generators which have just been completed but are not in operation yet (possibly due to testing).
US EIA, "Form EIA-860 Detailed Data, 2001-2011," http://www.eia.gov/electricity/data/eia860/index.html (accessed January 19, 2013).

[xxiv] For instance, the figure below shows the current unemployment rate by state, as of January, 2013 and the peak employment rate by state since the beginning of the Great Recession in December, 2007. California's peak unemployment rate was third highest among all states and California's January, 2013 unemployment rate was third highest among all states. Source: Calculated Risk "Graph Gallery," http://www.crgraphs.com/ (accessed January 21, 2013).



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[lxxxix] With respect to the heat transfer mechanism employed, the main types are:

- Dry cooling towers operate by heat transfer through a surface that separates the working fluid from ambient air, such as in a tube to air heat exchanger, utilizing convective heat transfer. They do not use evaporation.
- Wet cooling towers or open circuit cooling towers operate on the principle of evaporative cooling. The working fluid and the evaporated fluid (usually water) are one and the same.
- Fluid coolers or closed circuit cooling towers are hybrids that pass the working fluid through a tube bundle, upon which clean water is sprayed and a fan-induced draft applied.

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[xcii] California Energy Commission, "Sutter Power Plant Project," http://www.energy.ca.gov/sitingcases/sutterpower/ (accessed February 18 2013).
[xciii] David Mundstock, "An UNOFFICIAL History of Power Plant Licensing at the California Energy Commission, 1875-2001, Sutter Power Plant Project, Docket No. 97-AFC-2 (Sutter) http://www.energy.ca.gov/sitingcases/sutterpower/
[xciv] http://powerplanting.homestead.com/files/Sutter.htm (accessed February 16 2013)
[xcv] Paul C. Richins, Jr., Energy Facilities Siting Project Manager, California Energy Commission , "Sutter Power Project Issue Identification Report," p. 9 http://www.energy.ca.gov/sitingcases/sutterpower/documents/ISSUERPT.PDF (accessed February 16 2013).
[xcvi] To give the reader a sense of how the CEC and CEQA processes worked in this case, the procedural history as presented by the CEC is as follows:

> Procedural History
>
> Calpine Corporation petitioned the California Energy Commission for an exemption from the Notice of Intention requirements of Public Resource Code section 25502 for the prospective Sutter Power Project. Pursuant to Public Resources Code section 25540.6(a)(1), the Commission granted the exemption June 25, 1997.
>
> Between June and September 1997, five publicly noticed prefiling workshops were held to discuss the prospective Sutter Power Project and the Energy Commission's Application for Certification (AFC) data adequacy requirements.
>
> On December 15, 1997, Calpine filed the Sutter Power Project AFC. On January 21, 1998, the Energy Commission found that the application met the data adequacy requirements. On February 2, 1998, in order to more fully understand the project and adequately analyze the potential impacts associated with the project, Energy Commission staff filed a data request for additional information in nine technical areas. Data responses in air quality, biology, cultural resources, hazardous materials, land use, public health, soils and water, transmission system engineering and visual resources were due by March 4, 1998.
>
> The Preliminary Staff Assessment was completed and filed on July 1, 1998. A total of nine workshops were held in Yuba City to discuss and receive input for the Final Staff Assessment/Draft Environmental Impact Statement. The Final Staff Assessment was filed on October 19, 1998. Evidentiary Hearings were held on November 2,10, 16, and December 2, 1998.

The Presiding Member's Proposed Decision (PMPD) was issued on January 20, 1999. Written comments on the PMPD were due February 19, 1999, with the Committee holding a publicly noticed meeting on February 11, 1999, to take verbal comments. A revised PMPD was issued on March 2, 1999, with a publicly noticed meeting scheduled for March 10, 1999 to take additional comments. The full Commission considered the matter at a publicly noticed hearing on March 17, 1999, at which time they voted to adopt the recommendation of the committee, which was to approve the project (conditioned upon Sutter County adoption of the necessary General Plan Amendment and rezone). Sutter County approved the General Plan Amendment and rezone on April 6, 1999. The Energy Commission gave final approval of the project on April 14, 1999.

http://www.energy.ca.gov/sitingcases/sutterpower/ (accessed February 16 2013).

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[xcviii] This conclusion is based on the CEC staff letter. The issues report posted on the web was blank as of February 18, 2013. See http://www.energy.ca.gov/sitingcases/lapaloma/documents/98-09-11_ISSUE_REPORT.PDF for the blank issues report.

[xcix] California Energy Commission, Preliminary Staff Assessment, "La Paloma Generating Project, Application for Certification (98-AFC-2), Kern County, California," February 5, 1999, p. iv http://www.energy.ca.gov/sitingcases/lapaloma/documents/1999-02-05_PSA.PDF (accessed February 18 2013).

[c] California Energy Commission, "La Paloma Generating Power Plant Project," http://www.energy.ca.gov/sitingcases/lapaloma/ (accessed February 18 2013).

[ci] David Mundstock, "An UNOFFICIAL History of Power Plant Licensing at the California Energy Commission, 1975-2001, Project Summary, Sutter Power Plant Project, Docket No. 97-AFC-2 (Sutter)," http://powerplanting.homestead.com/files/Sutter.htm (accessed February 18 2013).

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[cxi] WateReuse Association, "Recycled Water Uses Allowed1 in California," as summarized by the City of Santa Rosa, http://ci.santa-rosa.ca.us/doclib/documents/rw_uses_in_ca.pdf (accessed February 19, 2013).