REWIRING CALIFORNIA:

INTEGRATING AGENDAS FOR ENERGY REFORM

LITTLE HOOVER COMMISSION

November 2012

Little Hoover Commission

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To Promote Economy and Efficiency

The Little Hoover Commission, formally known as the Milton Marks "Little Hoover" Commission on California State Government Organization and Economy, is an independent state oversight agency.

By statute, the Commission is a bipartisan board composed of five public members appointed by the governor, four public members appointed by the Legislature, two senators and two assemblymembers.

In creating the Commission in 1962, the Legislature declared its purpose:

...to secure assistance for the Governor and itself in promoting economy, efficiency and improved services in the transaction of the public business in the various departments, agencies and instrumentalities of the executive branch of the state government, and in making the operation of all state departments, agencies and instrumentalities, and all expenditures of public funds, more directly responsive to the wishes of the people as expressed by their elected representatives....

The Commission fulfills this charge by listening to the public, consulting with the experts and conferring with the wise. In the course of its investigations, the Commission typically empanels advisory committees, conducts public hearings and visits government operations in action.

Its conclusions are submitted to the governor and the Legislature for their consideration. Recommendations often take the form of legislation, which the Commission supports through the legislative process.

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This report is available from the Commission's website.

State of California

LITTLE HOOVER COMMISSION

December 3, 2012

The Honorable Edmund G. Brown, Jr.
Governor of California

The Honorable Darrell Steinberg
President pro Tempore of the Senate
and members of the Senate

The Honorable Robert Huff
Senate Minority Leader

The Honorable John A. Pérez
Speaker of the Assembly
and members of the Assembly

The Honorable Connie Conway
Assembly Minority Leader

Dear Governor and Members of the Legislature:

California has embarked on an ambitious effort to reinvent its electrical power system, moving from one predominantly dependent on fossil fuels to one that increasingly emphasizes renewable energy.

By 2020, 33 percent of all California retail electricity sales will come from renewable power, the nations' highest renewable goal. The state is implementing this goal as it implements another groundbreaking policy, the Global Warming Solutions Act of 2006, which aims to reduce statewide greenhouse gas emissions to 1990 levels by 2020.

For the health of the state's environment and its economy, it is critical for California to get this transformation right. California cannot afford another energy policy failure. Ratepayers still bear the cost of the state's flawed energy deregulation, which badly bruised the state's reputation for policy innovation.

California's path to success, however, is complicated by a balkanized energy governance structure, a subject of concern to the Little Hoover Commission for nearly 40 years. Concerns about the state's capacity to reach its renewable power goals prompted Senator Mark Wyland, a member of the Commission, to request the Commission to examine the California's energy governance structure in this context.

In public hearings, the Commission was told repeatedly that the state is well on its way to achieving its Renewable Portfolio Standard goal, despite the burden of an organizational structure no one would have designed on purpose.

Witnesses at these hearings, however, also shed light on issues that went beyond structure, specifically on how rapidly integrating new renewable energy resources could cause electricity rates to rise, may affect reliability and may impede the state's ability to achieve other environmental policy goals. These goals include compliance with federal clean air and clean water laws, and developing river flow requirements to bolster the environmental health of the Sacramento San Joaquin River/Bay Delta.

The Commission's concerns center on reliability and a lack of clarity regarding the aggregated cost of implementing the state's consolidated energy policy goals. The failure to assure reliability or an unanticipated spike in rates could sour Californians on renewable energy policy, which would have repercussions nationwide and beyond.

Also not clear is the degree to which meeting California's renewable targets, while maintaining reliability, will come at the expense of the state's greenhouse gas reduction goals. Intermittent renewable resources, such as solar and wind, will require back-up power supplies, such as gas-fired plants. Hurricane Sandy has only fueled a sense of urgency to mitigate greenhouse gas emissions by those who see a linkage between emissions and global warming.

California can mitigate the need for additional fossil fuel plants if it develops a truly diverse portfolio of renewable resources without over-relying on any one source. By encouraging greater balance in its renewable portfolio, it can avoid unnecessary costs to both utility customers and to the environment.

The lack of an overall cost estimate points up a more profound concern. Despite assembling an ambitious agenda that has gained the world's attention, the state has failed to develop a comprehensive, energy strategy with clearly delineated priorities to ensure that policies are not working at cross-purposes and that California achieves its environmental stewardship goals.

Policies and regulations affecting electricity have been piled upon each other piecemeal. As a result, numerous state bodies are implementing a long and complicated list of new directives through multiple, sometimes overlapping public processes. In this report, the Commission calls for a timeout.

Ultimately, the Governor must take ownership and take the lead on bringing greater clarity regarding the costs and consequences of the aggregated energy policies being implemented in California. The Commission calls on the Governor to direct the state's energy organizations to assess the cumulative impact of recent major energy-related policies on electricity rates and reliability and whether these policies are achieving California's energy and environmental goals. This information should be made readily available to the public in an easy-to-understand format.

The Commission calls on the Governor to develop, through a public process, a comprehensive and cohesive state energy strategy that delineates and prioritizes goals. Such a plan should sequence implementation of this strategy in a way that maximizes progress toward these goals and minimizes avoidable costs. Until such a plan exists, the Commission urges policy-makers to refrain from imposing any new energy-related mandates.

As California moves toward cleaner, greener, and potentially more expensive energy resources, consumers must be empowered with the tools to make better decisions on electricity use. Consumers must be equipped to control their own electricity use by responding to price signals. Such tools can help shape behavior that can make demand response a more reliable part of the electricity load, offsetting the need for additional power plants.

Over the course of this study, led by vice chair David Schwarz, the Commission was told repeatedly that a major restructuring of state energy-related organizations and functions would set back the state's progress in meeting its Renewable Portfolio Standard goal. The Commission was told that government players are cooperating and collaborating as never before, in part due to strong personal connections forged over decades. This was demonstrated in real time this year with the unexpected shutdown of operating units at the San Onofre nuclear power plant: State and local players came together to quickly replace the lost power and voltage support required to keep the lights on in Southern California. The experience also revealed once again, however, that no one entity is in charge of the electricity system in California.

The structure of the state's system cannot depend solely upon individuals and personalities. In the end, the Commission reached the same conclusion as in prior reviews of energy governance – that the current structure lacks clarity and accountability. Organizational reform is essential if the state is to realize its manifold energy and environmental goals. The Commission recommends the Governor and the Legislature take steps now to modernize energy governance.

Lives and livelihoods are on the line. The Commission is committed to working with you and to ongoing public oversight until its concerns are addressed.

Sincerely,

Daniel W. Hancock
Chairman

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Table of Contents

Executive Summary i
Background – Electricity in California 1
Adding It All Up 27
The Commission's Study Process 67
Appendices & Notes 71
Appendix A: Public Hearing Witnesses 73
Appendix B: Letter from Senator Mark Wyland 75
Notes 77

Table of Sidebars & Charts

Warren-Alquist Act of 1974 2
Benefits of the Renewable Portfolio Standard 7
California Total System Power Used in 2011 8
Hourly Electricity Demand Forecast in California 9
California Total System Power from Renewable Energy Sources Used in 2011 11
Progress Toward Meeting RPS Target Goals 2011 12
Electricity Mix for California's 10 Largest Municipal Utilities 14
Once-Through Cooling Policy 18
Getting the Job Done: Kern County Renewable Energy 19
Government Processes Affecting RPS Implementation 21-
Improving Planning to Protect the Environment and Expedite Permitting 24
Hourly Breakdown of Renewable Resources 34
RPS Requirements – The Three Buckets 37
How California Sets Rates for Customers of Investor-Owned Utilities 40
LADWP: Cost Drivers for 1.4 Cent per Kilowatt Hour Rate Increase 44
Residential Demand Response Pricing Outside California 47
Goals for Electricity Rate Reform 49
Collaboration Among California Energy Organizations 53
Organizations Coordinating on Electricity in California 58
Prior Commission Studies on Energy Governance 67

Executive Summary

California is in the middle of a massive transformation in the way electricity is produced and distributed. It has embarked on an ambitious plan to modernize its electricity system from one predominantly powered by fossil fuels to one in which more than a third of all electricity will come from renewable energy resources. It is a transformation embedded in policy and legislation, one that seeks to reduce greenhouse gas emissions to reduce the impact of global warming and shrink the state's reliance on energy imports.

In 2011, the California Legislature and Governor Edmund G. Brown, Jr. expanded on that vision, signing the nation's most aggressive Renewable Portfolio Standard. California already was on an aggressive path toward a greater reliance on renewable energy as a result of earlier legislation, but the 2011 law set the bar higher – 33 percent of all retail electricity sales will come from renewable resources by 2020.

The Commission takes these policies as a starting point. The Commission's recommendations are focused on ensuring that California succeeds in this transformation. In its assessment of the state's path to achieving these goals, however, the Commission has identified concerns, which left unaddressed, increase the risk of a policy failure that California cannot afford:

- In a short period, the state has adopted a series of transformative policy initiatives, any of which taken individually would take years of careful planning to implement. The policies were adopted one at a time without the benefit of a cohesive design. Now they are being implemented simultaneously without an overarching plan.
- The state has not produced a comprehensive assessment of the total cost of implementing this group of policies, inhibiting consumers and businesses in their ability to plan for this new future.
- The state lacks the ability to impose order on the multitude of proceedings that determine how these policies unfold, order which is essential to ensuring the state maximizes progress toward each of its policies goals.

Californians have benefited from cutting-edge energy policies in the past, succeeding spectacularly in energy efficiency programs that set statewide standards for buildings and appliances. If the state can take credit for its success in energy efficiency, however, it also has to acknowledge California's bungled attempt at electricity deregulation. The debacle produced soaring costs for ratepayers and rolling blackouts. Nationwide, it marked a major setback for other attempts to modernize electricity markets and a huge bruise to California's reputation as a policy innovator.

When it comes to energy policy, details matter. The flawed design of energy deregulation policies in the mid-1990s left the electricity system open to gaming. Not only did the failed policy cost the electricity ratepayers billions of dollars, it cost Governor Gray Davis his job. Faced with sharply higher rates and power outages, Californians reached for the recall process to remove their Governor from office, only the second time in U.S. history a governor was removed via recall.[1]

In this review, the Commission's greatest concerns are reliability and a lack of clarity regarding the aggregated cost of implementing California's consolidated energy policy goals. Also not clear is the degree to which meeting renewable power targets will come at the expense of California greenhouse gas reduction goals, or to system reliability.

Reliability always is a concern, but one easier to manage when a large part of a system's baseload is generated by continuously operating power plants. By contrast, electricity generation from solar panels and wind turbines is intermittent. As the sun sets and the wind dies, these generating resources require back-up power, typically gas-fired plants that can ramp up quickly to replace the renewable resource on short notice. California's energy policy-makers face significant complexity in balancing the state's portfolio so that electricity remains reliable and affordable and utilities do not over-invest in new fossil-fuel powered back-up plants.

The Commission acknowledges this complexity. At the same time, however, it believes the state must provide greater clarity to California utility customers as to how implementation of the state's new energy policies, and attendant environmental policies, will affect their electricity bills.

New and intensified calls for renewable energy will continue, given increasing gasoline prices and the growing concern expressed by many regarding the effects of greenhouse gas emissions on global warming. Those who see a linkage between carbon dioxide emissions and global warming pointed to this year's Hurricane Sandy as a

consequence of changes to the earth's atmosphere. It has been used as an example of the growing stakes in the greenhouse gas debate.

No serious discussion concerning this linkage can occur unless all parties are willing to consider the costs associated with achieving greater energy independence and reduced reliance on carbon-based fuels, as well as the costs California is likely to suffer as a consequence of global warming. Nor can we avoid consideration of the reliability issues associated with dependence on renewable sources of energy. If anything, Sandy underscored the extent to which California's grid is vulnerable to extraordinary natural disaster.

Getting it right is far more important than speed: California will not be able to boast of its transformation to renewable power if after making significant investments in the rush to meet the 2020 deadline, the state is unable to achieve its clean air and clean water goals as well.

Such a failure would undermine Californians' confidence in state government. Its reverberations would weaken environmental stewardship and innovation nationwide and beyond.

Initial Focus on Governance

The Commission embarked on this study to focus on governance and organizational structure. Commission member and State Senator Mark Wyland asked the Commission to evaluate the agencies involved with implementing the Renewable Portfolio Standard to determine whether the current, diffused organizational structure would impede the utilities' abilities to achieve the goal by 2020. The Commission has a history of assessing California's energy governance structure going back to 1974, the year the California Energy Commission was established. The Commission repeatedly has found that California has a fractured policy-making process for energy and repeatedly has recommended reform.

The Commission's most recent assessment was in 2005 when Governor Arnold Schwarzenegger delivered a reorganization plan to the Commission that would have created a Department of Energy.

In that assessment, the Commission agreed with much of the proposal but ultimately could not endorse the plan as it included a provision that was deemed unconstitutional. The Commission, however, found that "the need for leadership on energy is essential and cannot be ignored."

The passage of numerous measures to promote independence from electricity producers outside California's borders and to reduce

greenhouse gas emissions in the years since 2005 only underscored the need for leadership.

The governance question, then, was whether California had the organizational structure in place to achieve these goals. The Commission held two public hearings in the fall of 2011, during which witnesses described a system structure that was not ideal, although all seemed to agree the Renewable Portfolio Standard could be achieved by 2020, despite shortcomings in structure. Some were confident the state could exceed that level by the deadline.

The Commission was told repeatedly that reorganization at this stage likely would disrupt progress that has been made, as it would generate litigation and additional uncertainty that would make it more difficult to attract financing for projects.

Though the Commission was assured that the existing organizational structure would not prevent the state from achieving its ambitious renewable goals, testimony from the witnesses sparked serious concern regarding costs and reliability of electricity as the state moves toward greater reliance on renewable energy.

The Commission learned that little has been done to assess and communicate the costs and benefits of the numerous laws that will affect electricity rates for years to come. As a result, the Commission scheduled a third hearing in February 2012 to focus on costs and reliability.

How Much Will It Cost?

The Commission is concerned that the Renewable Portfolio Standard is being implemented simultaneously with numerous other far-reaching policies, including greenhouse gas reduction and the associated cap-and-trade program; regulations to reduce the use of coastal water to cool power plants; the expansion of distributed electricity generation to 12,000 megawatts; and potential regulations dictating water flow from the state's hydroelectric facilities to improve the health of the Delta's ecosystem. On its own, each policy or regulation could influence electricity rates and reliability. Combined, the impact is far greater.

Until very recently, the cost of renewable energy has exceeded the cost of energy produced by plants powered by fossil fuels. Witnesses expressed concerns that in the rush to integrate renewables, the state, specifically, the California Public Utilities Commission (CPUC), was approving power purchase agreements that lock in peak renewable generating costs for

the three large investor-owned utilities that provide electricity to approximately three-fourths of all California customers. The power purchase agreements approved by the CPUC remain secret for three years and it will be a few years before the bulk of the already approved renewable projects come online and their costs are built into electricity rates. Until that time, consumers remain in the dark as far as how much the renewable energy contracts will affect their future electricity bills.

The CPUC Division of Ratepayer Advocates, which represents consumers during the power purchase agreement approval process, has publicly voiced concern over the costs of the long-term contracts. In a February 2011 report, the division expressed concerns that urgency to comply with the Renewable Portfolio Standard created inelastic demand for renewables that was driving very high prices.[2] In February 2012 testimony to the Commission, the acting executive director of the division said that the CPUC had accepted all but two of 170 contracts and that they were still looking at overpriced contracts.[3]

"I want to go beyond 33 percent, but we will not be able to do that if we break the bank beforehand."

Michel P. Florio, Commissioner, California Public Utilities Commission

CPUC Commissioner Michel Florio expressed serious concerns about the value of three renewable energy contracts that were before the commission for approval in May 2012. "I am a strong supporter of California's RPS goals, but at the same time I believe we can achieve those goals in a far more cost-effective manner," Commissioner Florio wrote in his dissent to approve the contracts.

Previous Estimates Out-of-Date

CPUC staff, working with outside consultants, earlier attempted to come up with a projection of what it would cost to implement the 33 percent renewable goal by 2020. A 2009 staff report indicated that total statewide electricity expenditures would be 10.2 percent higher if the state pursued the 33 percent goal rather than rely on additional investments in natural gas plants.[4]

Much has changed since the 2009 assessment. The costs of photovoltaic panels dropped dramatically in 2011 and 2012 as a result of a market glut from Chinese manufacturers. A February 2012 report from the CPUC, the first since legislation was passed in 2011 requiring reporting of aggregate costs of renewable contracts, indicated bids for power purchase agreements showed "significantly lower costs than bids from the past few years, which will be reflected in future IOU (investor-owned utilities) contracts."[5] At the same time, however, natural gas prices have plummeted, so even with the fall of renewable costs, the premium remains. While the Commission appreciates the difficulty in trying to model future fuel prices, the tools exist to incorporate different scenarios

and to illuminate the costs of trade-offs. What has been missing is the political will to develop and update an analysis that should be essential to a strategy for achieving the state's goals while avoiding unnecessary costs.

Most agree that utility customer rates will likely rise as a result of implementing the Renewable Portfolio Standard. Less clear is the significant risk that these rate increases will fall more heavily on some than others. Although low-income electricity customers and some with certain medical conditions are shielded from high costs, those who do not benefit from those protections and who use more electricity than others – particularly those in the Central Valley who run air conditioning more than do those on the temperate coast – effectively subsidize those who consume less. The California Public Utilities Commission has begun a proceeding to evaluate rate tiers in California. Without changes, some will unduly bear the burden of the inevitable rate increases more than others.

Demand response also can play a greater role than it has in the past to contain costs and rein in demand. Designing programs that empower electricity consumers to better manage their electricity use and control costs not only will help offset rising costs, but also can improve reliability and grid management.

Other cost drivers include trade-offs made in crafting the 2011 Renewable Portfolio Standard. The law favors in-state electricity production over potentially cheaper renewable energy produced outside of California. The goal was to bring new, green jobs to California to build, install and operate new power plants. Some contend that this preference for in-state renewable plants limits imports of renewable energy from other parts of the West while also limiting California exports.

Concerns also have been expressed that the utilities have not pursued and procured a diversified portfolio of renewable energy projects, and have paid scant attention to geothermal power, which offers greater reliability, as well as biomass generation.

Keeping the Lights On

Paramount in bringing such a large load of renewable energy onto the grid is keeping the lights on in California. The state's growing reliance on intermittent renewables presents an immense challenge for those operating the grid. The California Independent System Operator (CAISO), a public benefit corporation that manages electricity transmission for about 80 percent of California electricity customers, has noted swings of

as much as 800 megawatts in wind power in a half hour, power which must quickly be replaced by another energy source.[6]

Future technology breakthroughs in storage devices likely will provide a solution to some of the intermittency issues. Electric cars also can play a role, if charged in the mid-afternoon when solar peaks while electricity use is still low or at night when the wind picks up but consumption goes down.

Integrating an estimated 13,000 megawatts of new renewable energy coming online over the next decade is a highly complicated task. A senior CAISO representative also described the challenge of maintaining reliability when approximately 12,000 megawatts of fossil fuel-generated electricity is taken out of the system as utilities comply with recently-adopted water quality regulations.[7]

As the renewables are being brought online, California utilities are simultaneously complying with regulations adopted in 2010 by the State Water Resources Control Board. The new rules require either shutting down or retrofitting 19 coastal power plants (including the state's two nuclear plants) that use billions of gallons of ocean water every day to cool steam for generating electricity, a process harmful to sea life. The rules are designed to be implemented over the span of a decade, though the schedule can be modified if reliability is threatened.

Unexpected Complication

The CAISO has been highly effective at balancing power and avoiding rolling blackouts since the 2000-01 energy crisis, but the unexpected shutdown of both operating units at the San Onofre nuclear plant in January 2012 revealed California's continued vulnerability to power outages, particularly in coastal Southern California.

Radioactive leaks in steam generation tubes caused by premature wear forced the units' shutdown, taking approximately 2,200 megawatts of power, or enough to power about 1.4 million households, out of the system. Though no one had planned for an unscheduled outage of both San Onofre operating units, the CAISO partnered with numerous other state and local agencies to quickly to replace the lost capacity and restore voltage support for the peak-load summer of 2012.[8] With San Onofre's fate still up in the air, the CAISO already is planning for its continued outage for summer 2013.

Although some light will be shed on renewable contract costs in the coming years, no one has yet attempted to assess, in the aggregate, the impact that all the recent laws and regulations will have on electricity

costs. The authority to guide and regulate California's energy transformation is diffused across several organizations. In places, their authorities overlap, yet gaps in authority exist as well. The members of the boards and commissions who implement these policies are appointed by the Governor, putting the ultimate responsibility for outcomes in the Governor's hands. Californians have a right to know what they can expect to pay for electricity as policies affecting electricity are implemented. The Governor must make this a priority or risk ratepayer revolt and the potential loss of public support for California's environmental policy goals.

Cohesive Strategy Needed

The Legislature has set an ambitious agenda for clean energy. But an agenda is not an action plan.

While California boasts separate policies for energy efficiency, greenhouse gas emissions, renewable energy, demand response initiatives and other environmental regulations, it has failed to take the important step of integrating and coordinating these policies.

State policies affecting electricity have been piled upon each other piecemeal, an accretion without design, a monument both to the state's lack of a comprehensive energy plan and the nature of the legislative process.

If the state has been lax in providing a public accounting of the cumulative costs of its policies, it also has failed to take an overarching view of how all these separate pieces might fit into a comprehensive, cohesive energy strategy. Such a strategy necessarily would include clearly delineated priorities to ensure that policies are not working at cross-purposes and that California achieves its environmental stewardship goals.

California has benefitted from the Energy Commission's "loading order" approach for meeting the state's energy needs. This loading order has helped avoid costly investments by seeking other less expensive energy sources first. At the top has been energy efficiency and demand response, yet the state is still grappling with electricity rate tiers designed a decade ago during the height of the electricity crisis. As structured, the tiers limit California's ability to move forward with time-of-use pricing for residential customers. The California Public Utilities Commission took important action to introduce a smart meter strategy to lay the groundwork for better customer demand response. The commission reacted to missteps in early deployment by giving residential

customers an opportunity to opt out of smart meter installation. In doing so, the CPUC lowered the potential energy savings that could be achieved through the program and, ultimately, a way for customers to better manage their energy use.

It's Time for a Timeout

Witnesses in the Commission's study process said repeatedly that they are working to implement the state's goals, but they complained that California energy regulators, utilities and stakeholders are trying to do too much at once under a deluge of new policies. The number and complexity of these new policies leave scant time to sift or prioritize actions to ensure success.

Since 2003, California's Renewable Portfolio Standard has undergone a major legislative re-write every two to three years. Such shifts in public policy makes investors wary. It can take five to seven years or more to bring a new generating plant online and seven to 10 years to develop new transmission. In testimony, the executive director of the Independent Energy Producers Association told the Commission, that "constantly changing public policies put projects at risk to investors which comes with an economic impact."[9]

The Commission was told repeatedly that the state needs to stop sprinting forward on so many fronts and take a moment to collectively catch its breath.

Bob Foster, mayor of Long Beach and currently the chair of the California Independent System Operator, told the Commission at a February 2012 hearing that what California really needs now is a "timeout" on new energy mandates. This sentiment was echoed by other witnesses at the Commission's public hearing.

To prioritize current and future energy goals, the Governor, through a public process, must lead an effort to develop an overarching energy strategy. Until such a plan is in place, the Governor and the Legislature should enforce a moratorium on new energy-related mandates.

"Let's work on what we have and understand the consequences, get to a reasonable level and not add any new requirements right now."

Bob Foster, Mayor of Long Beach and Chair, California Independent System Operator

Leadership Lacking

The Commission began this study not only to assess the roles of the California Public Utilities Commission, the California Energy Commission and the California Independent System Operator, but also those organizations whose actions influence energy, such as the California Air Resources Board and the State Water Resources Control Board

The Commission has had concerns with the state's energy organizational structure for decades. In a 1974 review of the California Public Utilities Commission, the Commission recognized the critical importance and need for close coordination between the CPUC and the then-new California Energy Commission.

Though a legal flaw forced the Commission to return Governor Schwarzenegger's 2005 reorganization plan, the Commission generally supported the plan's main concepts as it would have consolidated energy-related programs in a new Department of Energy led by a secretary reporting directly to the Governor.

Importantly, the structure proposed in 2005 would have filled a leadership void. Currently, the Governor does not have a senior energy representative with the authority and resources to guide policy, develop strategy and improve implementation. The essential importance of energy to the economy, environment and the safety and stability of California communities suggests the need for one official who is accountable and responsible for guiding executive decisions.

The Commission was told that since the 2005 reorganization plan proposal, coordination among key agencies has improved. Paul Clannon, executive director of the California Public Utilities Commission, told the Commission, "planning is about 100 percent better than it was seven years ago."

The progress made in communication and coordination was articulated repeatedly. Witnesses pointed to California's Clean Energy Future effort, which brought together the Office of the Governor, the Public Utilities Commission, the Energy Commission, the Air Resources Board, the California Independent System Operator and the California Environmental Protection Agency to develop strategies and targets to achieve the state's ambitious energy and environmental goals.

The Commission was told that much of the progress in coordination also has been a function of the long relationships those in leadership roles have forged over decades as California was establishing its reputation as an energy policy innovator. Basing expectations of continued successful cooperation upon personalities and the players currently in place takes for granted that they will always be there.

The state still lacks a permanent energy leader to ensure all the players with complementary, sometimes competing missions work together toward state goals.

The Commission applauds the efforts achieved to improve communication and coordination and recognizes the potential disruption of a structural reorganization. The current approach, however, lacks accountability, clarity and sustainability.

Ultimately, accountability for ensuring an affordable and reliable electricity supply lies with one individual in California – the Governor. Both Governor Schwarzenegger and Governor Brown, through a senior advisor with the authority of the Governor's Office, have succeeded in corralling key energy players to help the state achieve its renewable energy goals.

Michael Picker, the Governor's senior advisor for renewable energy projects, has led the Renewable Energy Action Team and shepherded dozens of projects through federal, state and local red tape to get the state on track to achieve its renewable energy goals, mainly by bringing key players into the room.

"The Model: Get everyone together. Cut through the red tape to get it done."

Michael Picker, Senior Advisor to the Governor for Renewable Energy Facilities

The Governor should expand his leadership role to ensure the state integrates implementation of its various initiatives, so that it both meets its renewable energy goals and maximizes progress on reducing greenhouse gas emissions. The state also must integrate its ongoing work to meet federal clean air and clean water requirements into this energy strategy. The Office of the Governor must lead the effort to assess the total cost of these policies for consumers and to ensure that California can both meet its environmental goals and guarantee reliability. As part of this effort, the Governor should direct the development of a plan that outlines the state's energy strategy, prioritizes its energy goals and sequences implementation.

Managing a vital resource that affects the lives and livelihoods of all Californians, however, requires a permanent leadership structure. In the end, the Commission found organizational reform is still essential. The Commission recommends that the Governor and the Legislature develop a plan to modernize California's energy governance and organizational structure.

Because so much is at stake and the consequences of failure so high, the Little Hoover Commission is committed to continued oversight of progress in achieving California's energy and environmental goals. As such, the Commission has committed itself to holding public hearings and meetings in 2013 and beyond until its concerns and recommendations, outlined on the following pages, are addressed.

Recommendation 1: The Governor, through executive order, should direct the California Energy Commission, the California Public Utilities Commission, the California Air Resources Board, the State Water Resources Control Board and other appropriate executive branch organizations to address the following concerns raised by the Little Hoover Commission in a timely manner, as indicated:

- How much in the aggregate will recent major policies related to energy affect electricity reliability and rates, and are these policies achieving California's stated environmental and economic goals? The assessment should identify and quantify trade-offs involved when aspects of one goal conflict with another. The major policies, and their implementing regulations, that should be assessed in the aggregate include:
  - ✓ California Renewable Energy Resources Act of 2011
    - Renewable energy plant development costs
    - Transmission costs
    - Back-up generation costs
  - ✓ Global Warming Solutions Act of 2006
  - ✓ State Water Resources Control Board Once-Through Cooling Regulations
  - ✓ Governor's goal to build 12,000 megawatts of localized electricity generation
  - ✓ The Commission requests that this assessment be completed in six months and updated annually.
  - ✓ Additional major policies, as they are implemented, such as the State Water Resources Control Board's flow criteria required for the Delta ecosystem sustainability, should be added to the annual assessment.
- What portion of consumers' electricity bills can and will be attributed to major repairs, upgrades and new construction of all electricity generating plants and electricity transmission in California?
  - ✓ The California Energy Commission should develop guidelines for all the publicly-owned utilities and the California Public Utilities Commission should require all of the utilities it regulates to provide and include an easy-to-understand chart with their customers' bills and posted on their websites that shows the breakdown of all the costs reflected in the retail price of electricity.
  - ✓ The Commission requests that these charts be completed in six months and updated annually.
- As the California Public Utilities Commission develops rules to transition ratepayers to time-of-use and dynamic pricing, the state should identify additional barriers that need to be overcome so that California consumers can better manage their energy use and take advantage of fiscal incentives to reduce and strategically time energy consumption. This assessment should include a roadmap and deadlines for implementation.

- ✓ The Commission requests that this assessment be completed in six months.

Recommendation 2: The Governor, through a public process, should establish a comprehensive plan to prioritize current and future energy goals. The plan should identify what actions need to be taken and in what order to maximize progress toward the stated goals.

- ❑ The plan should include guidelines to ensure that proposed legislation is consistent with the goals of the plan.
- ❑ Until the state develops a strategic energy plan, the Governor, through use of veto power, or the Legislature, through its policy committees, should enforce a moratorium on new energy-related mandates.
  - ✓ The Commission requests that this strategy be completed in 18 months.

Recommendation 3: The Governor and the Legislature should develop a plan to modernize energy governance. Organizational reform ultimately is essential if the state is to realize its manifold energy and environmental goals and reduce the risk of another profoundly expensive policy failure.

- ❑ The plan should identify what steps are necessary to restructure the state's energy governance, including options that can occur with and without a Constitutional amendment.
- ❑ The process should give careful consideration to the establishment of a Secretary of Energy, reporting to the Governor, and the consolidation of all energy policy under one agency or commission, with the Secretary of Energy serving as agency secretary or commission chair.
  - ✓ The Commission requests that this strategy be completed in 24 months.

[1]National Conference of State Legislatures. June 6, 2012. "Recall of State Officials." http://www.ncsl.org/legislatures-elections/elections/recall-of-state-officials.aspx.

[2] Division of Ratepayer Advocates. February 2011. "Green Rush: Investor-Owned Utilities' Compliance with the Renewables Portfolio Standard."

[3] Joe Como, Acting Director, Division of Ratepayer Advocates, California Public Utilities Commission. February 28, 2012. Testimony to the Commission.

[4] Paul Douglas, Elizabeth Stoltzfus, Anne Gillette and Jaclyn Marks, California Public Utilities Commission, and Energy and Environmental Economics, Inc., and Aspen Environmental Group. June 2009. "33% RPS Implementation Analysis Preliminary Results."

[5] California Public Utilities Commission. February 3, 2012. "Renewable Portfolio Standard Quarterly Report 4th Quarter 2011 – Cost Reporting in Compliance with SB 836."

[6] California Independent System Operator. August 22, 2012. "2012 State of the Grid."

[7] Karen Edson, Vice President, Policy and Client Services, California Independent System Operator. November 15, 2012. Written testimony to the Commission.

[8] California Energy Commission. June 22, 2012. Lead Commissioner Workshop on Electricity Infrastructure Issues in California. Meeting discussion.

[9] Jan Smutny-Jones, Executive Director, Independent Energy Producers Association. February 12, 2012. Written testimony to the Commission.

Background

California has a history of being in the vanguard on energy policy. It is a national leader in efficiency, keeping per capita electricity consumption in the state flat for three decades, while the nation's average rose 50 percent.[10] Behind this success are California laws and regulations that drove energy efficiency into how contractors built houses and manufacturers made appliances

In renewable energy, California ranks second only behind Washington with its massive hydroelectric power plants. If large hydroelectric power is removed from the equation, California ranks first in renewables.[11] California aspires to go further. In 2011, California lawmakers enacted a Renewable Portfolio Standard that sets the bar higher than any other state: 33 percent of all retail electricity sales must be from renewable energy sources by 2020, a goal that most agree is reachable.

California's embrace of environmentally friendly energy policies can be traced back to the 1970s, with the creation of the California Energy Commission through the Warren-Alquist Act of 1974, a significant change to an energy system that had remained relatively unchanged since its inception at the turn of the 20th century. California has led the way in regard to cap-and-trade in an effort to reduce greenhouse gas and carbon emissions.

History of Electricity in California

For much of the past 100 years in California, electricity was supplied by utilities empowered to generate, transmit and sell it to households and businesses. In the late 1800s and early 1900s, two types of electric utilities emerged: municipally-owned utilities and investor-owned utilities. Both functioned as monopolies serving all of the customers in a defined geographic area.

Some cities and irrigation districts established municipally-owned utilities by building hydroelectric facilities and providing street lighting. About one-fourth of California residents are served by these municipal utilities. Municipal utilities operate under the direction of locally-elected officials who set rates and manage and oversee the operations of the utility.

Three investor-owned utilities (IOUs), Pacific Gas and Electric, San Diego Gas and Electric and Southern California Edison, provide electricity to the majority of California's electricity customers. Other IOUs, serving a much smaller customer base, include PacificCorp, which serves customers near the Oregon border; California Pacific Electric Company, providing service near Lake Tahoe; and Bear Valley Electric in the Big Bear Lake community. In exchange for essentially operating as geographic monopolies, the investor-owned utilities agreed to regulatory oversight of their prices and investments. The California Public Utilities Commission in 1912 was given the authority to approve electricity rates for investor-owned utilities, attempting to balance the needs of consumers and shareholders by making sure that rates are fair and affordable.

Little changed in California's energy market until the 1960s and 1970s. In 1968, California took the lead in tackling air pollution with the establishment of the California Air Resources Board, which regulates emissions, including emissions from stationary sources such as power plants. Fueled by the worldwide energy crisis, in 1974 the Legislature enacted and then-Governor Ronald Reagan signed the Warren-Alquist Act creating what is now called the California Energy Commission. The California Energy Commission is the state's primary energy policy and planning agency and was designed in response to concerns that the CPUC's economic-based regulation did not consider environmental issues related to energy use at a time utilities were pushing to build nuclear power plants. The commission also is charged with licensing all thermal power plants with generating capacity of 50 megawatts or more and, significantly, developing minimum energy efficiency requirements for new construction and for appliances, which have proven a tremendous success at keeping per capita energy consumption in California relatively flat despite significant population growth.

Efficiency and clean air policies born in the 1960s and 1970s and refined over time have put California at the forefront of energy efficiency and have had a critical role in shaping the state's energy system today.

Warren-Alquist Act of 1974

The Legislature enacted and then-Governor Ronald Reagan signed the Warren-Alquist Act in 1974 declaring an over-arching state policy for energy efficiency.

> *"The Legislature hereby finds and declares that electrical energy is essential to the health, safety and welfare of the people of this state and to the state economy, and that it is the responsibility of state government to ensure that a reliable supply of electrical energy is maintained at a level consistent with the need for such energy for protection of public health and safety, for promotion of the general welfare, and for environmental quality protection. It is further the policy of the state and the intent of the Legislature to employ a range of measures to reduce wasteful, uneconomical, and unnecessary uses of energy, thereby reducing the rate of growth of energy consumption, prudently conserve energy resources, and assure statewide environmental, public safety, and land use goals."*

Sources: AB 1575 (Warren) 1974. Public Resources Code Section 25001 and 25007.

Not all of California's forward-thinking energy policies have met with success. As Californians painfully learned from the state's 1996 attempt to deregulate electricity, being ahead also can be dangerous and expensive. The fallout from the flawed design of the deregulated electricity market turned a lofty energy policy discussion into front page news when rolling blackouts and skyrocketing electricity prices slammed the state in 2000 and 2001.

Understanding California's deregulation fiasco is critical to understanding how getting energy policy wrong can obliterate trust in governance for years to come, particularly in cases where political expediency trumps careful and transparent monitoring of new policies as they are implemented. The crisis laid bare the dysfunctional governance structure under which no one entity is in charge when it comes to keeping the lights on and keeping rates affordable in California. It revealed that regulatory bodies designed a hundred years ago were not nimble enough to respond to the crisis. California paid dearly for its miscalculations. Billions of dollars were and continue to be spent in response to the 2000-01 crisis. Californians' trust that their elected officials could lead and govern in a time of crisis was greatly diminished. As California once again embarks to implement ambitious energy policy goals with a self-imposed timeline, it cannot fail again.

Learning from Past Mistakes

After nearly 100 years of the status quo, deregulation policy in California began to take shape in the early 1990s, through an effort led by the California Public Utilities Commission (CPUC) to develop a restructuring plan that would encourage more investment in electricity plants and transmission, to reduce costs for consumers and improve efficiency in the system.

In 1996, the Federal Energy Regulatory Commission (FERC) opened the door to electricity deregulation, allowing wholesale electricity trading between generators, marketers and retail customers on a national scale. The CPUC plan laid the foundation that led to AB 1890, the Electric Utility Industry Restructuring Act, unanimously enacted by California lawmakers and signed by Governor Pete Wilson in 1996. The law created a new, competitive market structure for electricity generation. The law allowed most customers to choose their electricity generation supplier, commonly called direct access, and also established a number of other significant changes to California's regulatory structure for electricity.

Open markets created an opportunity for non-utilities to become electricity generators, producing and selling power to investor-owned

utilities, municipal utilities, energy marketers and electricity customers. As part of the energy market restructuring, the CPUC required the investor-owned utilities to divest at least 50 percent of their electricity generating assets, and they had strong financial incentives to divest even more generation. By 2000, less than 30 percent of the electricity sold in California was generated by the investor-owned utilities.[12]

Until deregulation, the investor-owned utilities owned and operated most of the state's transmission system as well as the state's power plants. To provide new power producers equal opportunity and ability to deliver their supplies over the transmission system, AB 1890 created the California Independent System Operator (CAISO), a public benefit corporation. The utilities retained ownership of their transmission systems, but were required to transfer operational control to the CAISO. The CAISO operates the state's transmission system to schedule delivery of electric supplies and ensures that no particular buyer or seller of electricity can block access by others. The CAISO is required to schedule reserve electricity generation in the event that an energy provider cannot deliver the required amount of power. To do this, the CAISO operates a market for ancillary electricity services, into which generators offer reserve capacity – the ability to provide power within minutes if called upon.

Under AB 1890, the state also created the Power Exchange, an entity which operated like a commodities market. The Power Exchange solicited bids from electricity buyers and generators and chose the lowest generation bids until the exchange had enough electricity to meet requests for power. To foster competition, the investor-owned utilities were prohibited from signing long-term contracts with power plant operators.[13]

California's deregulated electricity market, which started in March 1998, worked fairly well at first. In the summer of 2000, however, the price of wholesale electricity sold on the Power Exchange started to escalate. From June to July in 2000, wholesale electricity prices increased on average 270 percent more than during the same period in 1999 as unregulated energy generators began taking advantage of the weaknesses in the system design, sometimes illegally.[14] By December 2000, wholesale prices on the exchange hit nearly $377 per megawatt-hour, more than 11 times higher than the average price of $29.71 in December 1999.[15]

Rate Caps Crush Utilities As Wholesale Prices Surge

During the initial implementation of the market deregulation, rates were held steady for utility customers. Rate freezes were established in part to help the utilities recover the costs of stranded assets – power plants that had been built and brought online under the old rules and regulations. Under the new system, these plants would not retain their value. It was thought that competition in the deregulated market would result in much cheaper electricity, which would make it difficult for the investor-owned utilities to recoup the costs of the stranded assets. The rate freezes were to remain in place until the utilities had paid off the debt on the stranded assets. The rate freezes also kept electricity prices stable for consumers as the state moved toward a competitive market.

The rate freeze for San Diego Gas and Electric was eliminated in 1999, and as wholesale costs surged in 2000, its customers were exposed to unregulated retail electricity prices as the utility passed its mounting costs onto its customers.

Rate caps remained in place for Pacific Gas and Electric and Southern California Edison. The cap on what the utilities could charge customers combined with an open market for wholesale electricity and rules that prohibited the investor-owned utilities from locking in lower rates through long-term contracts proved to be key design flaws of California's deregulated system. As wholesale prices escalated, consumers were immune (as long as the caps were in place), and so lacked incentive to cut back on electricity consumption. The retail cap coupled with escalating wholesale prices put California's investor-owned utilities in severe financial difficulty, the worst being Pacific Gas and Electric, which filed for bankruptcy protection in April 2001.

Besides being unaffordable, California's energy system was unstable, leading to 38 "Stage 3" emergencies in 2001, many of which led to rolling blackouts. Prior to 2001, the California Independent System Operator had issued only one Stage 3 emergency alert since its inception in 1998. There have been no Stage 3 emergencies issued by the CAISO since 2001.[16]

State Steps In As Buyer

As the situation spiraled out of control, the Governor and the Legislature stepped in, and in February 2001 enacted emergency legislation to cap retail electricity prices for investor-owned utilities.[17] The legislation also authorized the California Department of Water Resources to purchase power through long-term contracts to sell to Pacific Gas & Electric and

Southern California Edison, as electricity generators at the time were unwilling to sell to the financially floundering utilities.[18] The department signed 58 long-term contracts totaling $42 billion. The total cost of California electricity grew from $7.4 billion in 1999 to more than $27 billion in 2000 and $26 billion in 2001 – $40 billion extra due to the flawed design of the open wholesale market.[19] More than half of the contracts were later renegotiated and as of 2011, $4 billion had been recovered through legal settlements.[20]

In 2002, the Department of Water Resources issued $11.3 billion in revenue bonds to repay $6.5 billion that had come from the state's General Fund to purchase electricity during the crisis and to retire a short-term loan. The costs of the long-term contracts and the revenue bonds have been passed on to the customers of the investor-owned utilities. After 10 years, the Department of Water Resources is close to exiting the electricity purchasing business. The last of the contracts expires in 2015. Ratepayers continue to pay off the revenue bonds, a cost of approximately $850 million in 2012. As of June 2012, the state still owed approximately $7.1 billion for the revenue bonds. If the ratepayers continue to pay off the bonds at the current rate, the bonds should be retired around the end of the decade.[21]

During the crisis, the Federal Energy Regulatory Commission eventually stepped in and ordered the elimination of the mandatory requirement that the investor-owned utilities buy and sell all of their electricity through the Power Exchange. The exchange ceased operating in 2001.

Aftermath: Clean-up Legislation

Legislative changes enacted in California after the crisis allowed the investor-owned utilities to secure long-term electricity supplies through a competitive bidding process. The utilities are required to contract for a sufficient 10-year power supply to meet forecasted peak demand plus a reserve margin. The California Public Utilities Commission approved the utilities' first long-term procurement plans in April 2004. In addition to stabilizing prices, the long-term contracts:

- Reduced the IOUs' exposure to price volatility in short-term markets.
- Decreased the wholesale generators' incentive to manipulate prices.
- Increased investment in new power plants.[22]

During the dramatic changes of deregulating California's energy market in the 1990s and the energy crisis that followed in 2000-01, much of the state's other energy priorities were put on the back burner and, due to the market uncertainty, investment in generation and transmission

infrastructure was relatively stagnant. One lasting outcome of this policy experiment: In California, much of the generation of electricity remains separated from the distribution of electricity.

Expanding the Energy Portfolio

Coming off the sting of the energy debacle, policy-makers were eager to find ways to better ensure California's energy independence from out-of-state operators and to avoid electricity price spikes. Developing a broader portfolio of in-state electricity sources was an attractive way to achieve both.

Renewable energy provided an answer. The promised benefits were easy to visualize: reduced greenhouse gas emissions; independence from energy imports; improved reliability and safety; new jobs from a burgeoning green economy.

Renewable Portfolio Standard

In response to the energy crisis and also to emerging climate change concerns, California lawmakers in 2002 enacted SB 1078 (Sher) which established the Renewables Portfolio Standard (RPS) with a goal of reducing reliance on natural gas imported from other states by expanding the use of renewable energy to 20 percent of the power supply by 2017. At the time, approximately 36 percent of California's electricity generation came from plants powered by natural gas, 20 percent from

Benefits of the Renewable Portfolio Standard

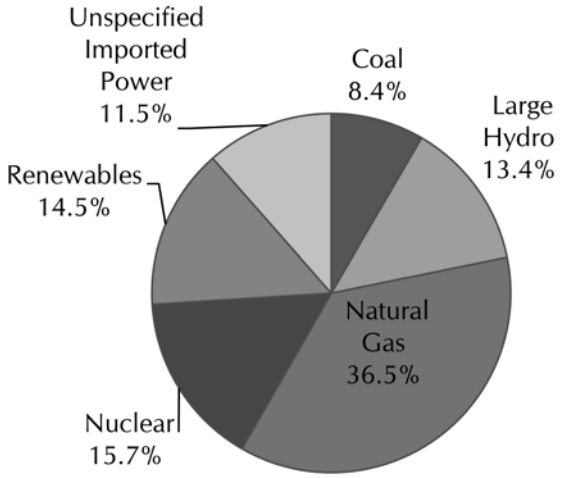
SBX1 2, which established the 33 percent renewal portfolio standard, identified nine unique benefits to California, each of which, according to the legislation independently justifies the program:

1. Displacing fossil fuel consumption within the state.
2. Adding new electricity generating facilities in the transmission network within the Western Electricity Coordinating Council service area.
3. Reducing air pollution in the state.
4. Meeting the state's climate change goals by reducing emissions of greenhouse gases associated with electricity generation.
5. Promoting stable retail rates for electricity service.
6. Meeting the state's need for a diversified and balanced energy generation portfolio.
7. Assistance with meeting the state's resource adequacy requirements.
8. Contributing to the safe and reliable operation of the electricity grid, including providing predictable supply, voltage support, lower line losses, and congestion relief.
9. Implementing the state's transmission and land use planning activities related to the development of eligible renewable energy resources.

coal, 18 percent from large hydroelectric, 15 percent from nuclear power and 11 percent from renewables.[23]

Legislation enacted in 2006, SB 107 (Simitian) accelerated the target date to 2010. Governor Arnold Schwarzenegger, in November 2008, issued an executive order setting a new target of 33 percent renewables by 2020.[24] Building on the prior legislation and the executive order, in September 2009, the Legislature enacted SB 14 (Simitian) which codified the executive order, but also added additional permitting requirements and prioritized in-state renewable energy sources. Governor Schwarzenegger vetoed that bill. In his veto message, he indicated that he supported the 33 percent goal, but indicated the bill added "new regulatory hurdles to permitting renewable resources in the state, at the same time limiting the importation of cost-effective renewable energy from other states in the West."[25] Governor Schwarzenegger issued another executive order in September 2009 directing the California Air Resources Board to develop regulations to achieve a goal of 33 percent renewable energy by 2020.[26]

California Total System Power Used in 2011
284,953 Gigawatt Hours



Source: California Energy Commission. August 2011. "Energy Almanac: Total System Power."

In the 2011-12 legislative session, Senator Joe Simitian introduced SBX1 2, a bill similar to the one vetoed by Governor Schwarzenegger. In April 2011 the Legislature enacted and Governor Brown signed SBX1 2 (Simitian), the most ambitious Renewable Portfolio Standard in the nation, requiring 33 percent of all retail energy in California to come from renewable sources by 2020.

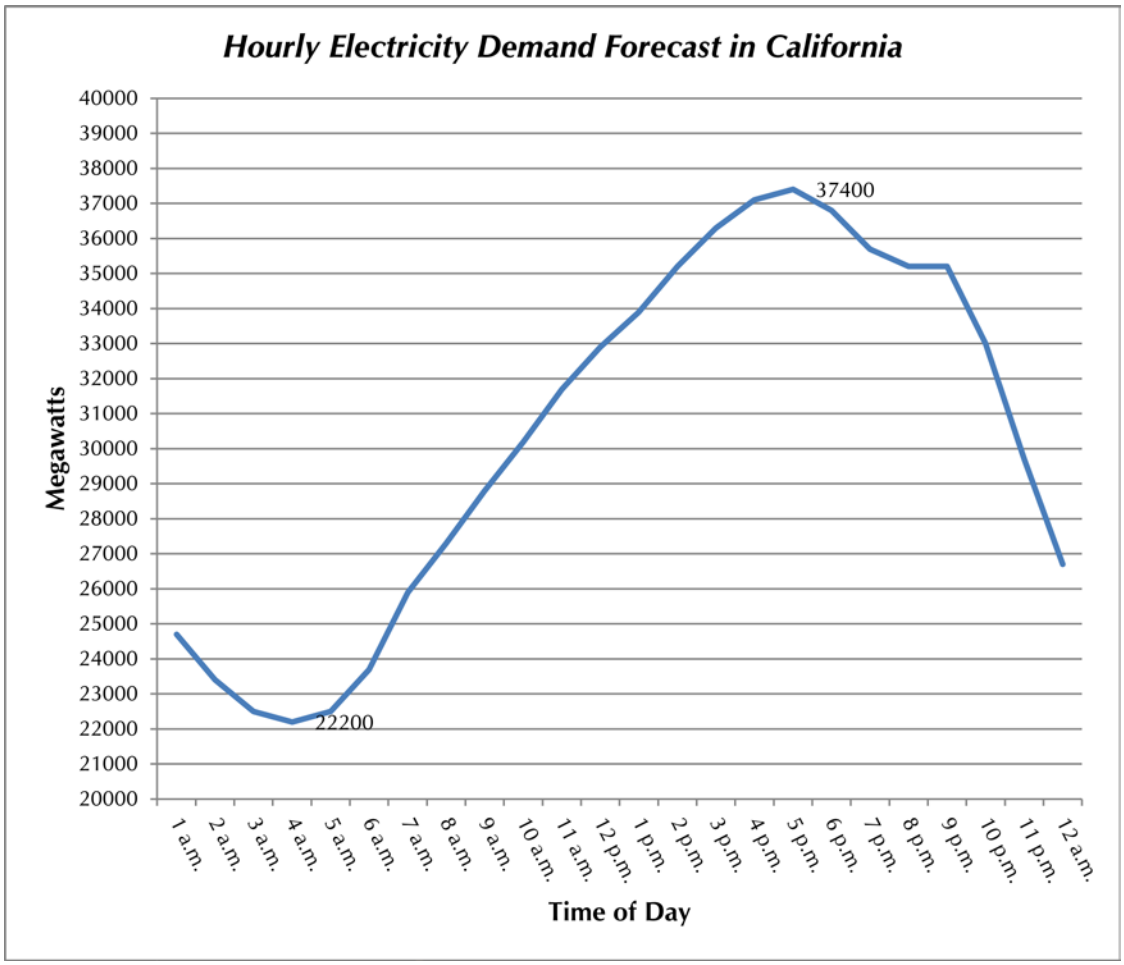
As a result of the Renewable Portfolio Standard laws, by 2011, 16.6 percent of California's power mix came from in-state renewables, mostly displacing coal, which fell to just 8.4 percent of the power mix. Overall, when diluted with out-of-state power imports, nearly 30 percent in 2011, approximately 14.5 percent of California's power mix comes from renewable resources.[27]

Although the California power mix provides a useful picture of electricity sources used in the state, it is not the data used to calculate utilities' success in achieving the Renewable Portfolio Standard goals. The

Renewable Portfolio Standard is calculated by retail sales – electricity delivered to consumers via retail sales – and does not include non-retail loads (such as the electricity used to deliver water) or the 7-8 percent of the overall mix that is lost during transmission.[28]

Not All Power Is Equal

Electrical power demand in California is not constant over the course of 24 hours, though it generally does follow a pattern. Power use is lowest in the early hours of the morning, rises over the course of the day as people go to work and school and peaks in the early evening when people return home and run their appliances and heat or cool their homes. The California Independent System Operator as well as the other balancing authorities in California plan for power usage based on historical consumption and factor in other variables, particularly weather forecasts.



Source: California Independent System Operator. August 31, 2011. "Today's Outlook – Supply & Demand." http://www.caiso.com/outlook/SystemStatus.html

With more renewable energy entering the electricity grid, balancing available power with electricity consumption becomes a more difficult challenge as power output from renewable power plants, particularly solar and wind, fluctuates over the course of the day.

Energy plants are typically described as either baseload plants or peaker plants. Traditional baseload plants fired by coal and nuclear energy typically fire up slowly but then run for months, providing a stable source of electricity around the clock.

Some renewable energy plants also provide baseload power. Geothermal energy plants, which provide nearly a third of all current renewable power, excluding large hydroelectricity plants, provide baseload power as do biomass plants.

California utilities fill the gaps with a variety of "peaker" plants to balance the electricity available with energy demands when energy use peaks late in the afternoon and early evening. Peaker plants are typically natural-gas-fired plants that can come online relatively quickly to add supply. In between baseload and peaker plants are a separate category of plants known as "load-following" plants which adjust power output to accommodate fluctuating needs over the course of a day.

Solar and wind-powered plants, both a growing part of California's renewable portfolio, are intermittent resources because they are dependent upon sunlight and weather patterns to generate electricity. While sunlight patterns for the most part are predictable, wind can be much more volatile. The California Independent System Operator has noted swings of as much as 800 megawatts in wind power in a half hour, which must quickly be replaced by another energy source.[29] Until affordable storage devices are available to smooth out the generation gaps associated with solar and wind energy, back-up gas-fired peaker plants will be needed to replace capacity losses on cloudy days and when the wind dies down. Maintaining a balance of renewables in California's electricity portfolio will enable the state to achieve its goal without additional risks to reliability.

Renewable Energy Sources in California

Currently, large hydroelectric plants, primarily located on the dams in Northern California, provide approximately 13 percent of the energy resources in California. Hydroelectric facilities that can generate more than 30 megawatts of electricity, however, do not count toward achieving the renewable portfolio standard, even though hydroelectric power is a renewable source of energy. This policy choice was made to encourage

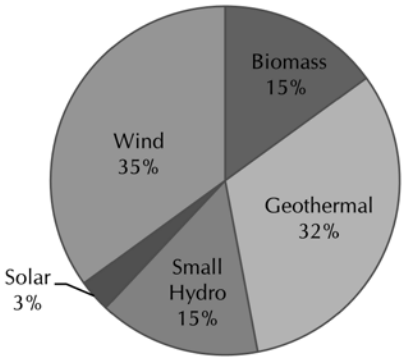
the development of new sources of renewable energy and to avoid controversies related to water storage.

Other sources of renewable energy in California are geothermal energy, biomass, biogas, small hydroelectricity, solar, wind, wave and tidal power.

Geothermal plants provided nearly one-third of all renewable power (excluding large hydroelectric) in 2011. While geothermal plants can be more expensive to build than other types of renewable plants, they do not require back-up generation as do intermittent sources. Geothermal plants rely on deep wells that use underground magma and rock that heat water or create steam that then is pumped to the Earth's surface to generate electricity.

Biomass is another growing form of renewable energy. Organic material from plants and animals, such as wood, crops, manure and some garbage, when burned, releases heat to produce steam to make electricity. Biomass also can be turned into fuel without burning. Rotting organic waste creates methane, which also is called biogas.

California Total System Power from Renewable Energy Sources Used in 2011
41,393 Gigawatt Hours



Source: California Energy Commission. August 2011. "Energy Almanac: Total System Power."

California's Renewable Portfolio Standard counts electricity generated by small hydroelectricity plants, those producing 30 megawatts or less of power, toward the Renewable Portfolio Standard. Hydroelectricity is less volatile on a daily basis than some other renewable energy sources, but can fluctuate depending upon season, quantity of rainfall and laws that regulate water flow for water quality and for flood and wildlife protection.

Wind energy plants rely on wind-powered turbines. Wind and the energy it creates in California typically rises at night and drops off during the day. Conversely, solar energy peaks in the day and drops off when the sun sets. Generally, there are two types of solar plants, those made up of photovoltaic panels which change sunlight directly into electricity and solar thermal plants, which use sunlight to heat a fluid to produce steam that is then used to power a generator.

What Will it Take to Achieve the RPS Goal?

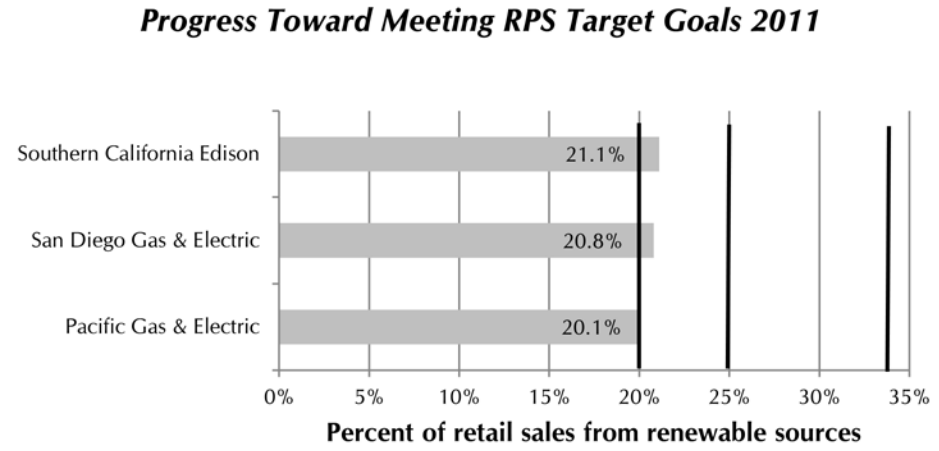
When the Little Hoover Commission first embarked on this study, the primary question it asked was whether the state could achieve its goal of 33 percent renewable energy by 2020 with the state's government organizational structure, described as dysfunctional even by some of those who are part of the system.

In two hearings held in the fall of 2011, witnesses confirmed that California utilities are on track for reaching the state's goal. The RPS legislation tasked the CPUC with measuring whether investor-owned utilities, which provide the majority of electricity in California, achieve the 33 percent goal. The CPUC also is assigned the role of scorekeeper on RPS achievement for the small number of electric service providers and community-choice aggregators.[30] The California Energy Commission is responsible for certifying all RPS-eligible generation resources for all utilities and is charged with measuring whether the municipal utilities achieve the RPS goal.

There are intermediate targets within the overall RPS goal: achieving an average of 20 percent renewables between 2011 and 2013, 25 percent renewables between 2014 and 2016 and 33 percent renewables between 2017 and 2020 and maintaining 33 percent beyond 2020.

Investor-Owned Utilities' RPS Progress

The large investor-owned utilities have reported that "they served 20.6% of their electricity with RPS-eligible generation in 2011 (up from 17% in in 2010)." Specifically in 2011, Pacific Gas and Electric achieved 20.1 percent, Southern California Edison achieved 21.1 percent and San Diego Gas and Electric achieved 20.8 percent.[31]



Source: California Public Utilities Commission. "Renewable Portfolio Standard Quarterly Report: 1st and 2nd Quarter 2012."

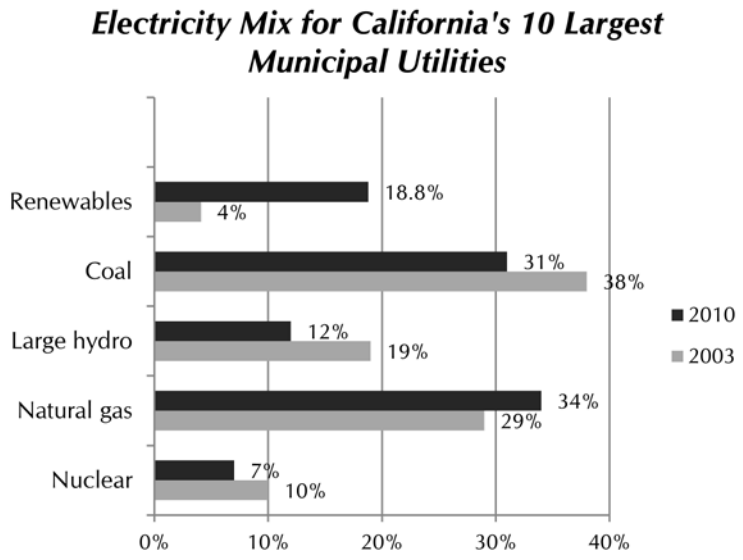
According to the CPUC, 2,871 megawatts of new renewable capacity have become commercially available since 2003. More than 300 megawatts of new capacity came online between January and June 2012, and an additional 2,500 megawatts were scheduled to come online by late 2012. Since 2002, the CPUC has approved more than 200 contracts for more than 18,500 megawatts of renewable capacity.[32] Not all of these contracts will lead to energy production. Even with an expected failure rate of 40 percent of the contracts, however, the investor-owned utilities anticipate that they will achieve the 33 percent goal by 2020.

Municipal Utilities' RPS Progress: 2011 Legislation Raises the Bar

As originally enacted in 2002, California's Renewable Portfolio Standard did not require municipal utilities to meet the target of 20 percent renewables by 2017.[33] The 2002 law required municipal utilities to create their own programs for renewable energy and to adopt targets that mirrored the requirements for the investor-owned utilities, but took into account the effect on rates, reliability and resources. Some municipal utilities, including Los Angeles Department of Water and Power, Sacramento Municipal Utility District and the Imperial Irrigation District, adopted goals that matched the original RPS, while others set less ambitious goals. The 2011 legislation that ramped up the renewable requirement to 33 percent by 2020 also changed the compliance for municipal utilities from voluntary to mandatory and put the California Energy Commission, for the most part, in charge of overseeing RPS implementation by the municipal utilities.

In a July 2012 report, the Union of Concerned Scientists analyzed the progress of California's 10 largest municipal utilities in achieving the state's renewable energy goal. According to the report, renewable energy sources that qualify under the state's RPS program in 2010 made up 18.8 percent of the electricity mix for California's 10 largest municipal utilities, up from just 4.1 percent in 2003.[34]

The report found that individually, four of the 10 largest municipal utilities met California's previous goal of 20 percent renewables by 2010: Silicon Valley Power, Turlock Irrigation District, Sacramento Municipal Utility District and Los Angeles Department of Water and Power. Silicon Valley Power is well on its way to achieve 33 percent by 2020 as it had reached 25.1 percent in 2010, in part because the utility embraced renewable energy before the first state RPS legislation was enacted.[35] At the other end of the spectrum, the Imperial Irrigation District, despite setting an early goal for achieving the RPS, had only 8.3 percent RPS-approved renewables in its total energy mix in 2010. Burbank Water and Power, the smallest utility analyzed in the report, achieved just 7 percent renewables.[36]



Note: The electricity mix totals more than 100 percent of retail sales because the figures include electricity lost through transmission.

Source: Union of Concerned Scientists. July 2012. "The Clean Energy Race: How Do California's Public Utilities Measure Up?"

Part of the reason that California utilities are on track to achieve the state's RPS targets is that the state's energy organizations are working together and coordinating at an unprecedented level. This cooperative spirit, particularly during the past several years, also is the product of a Herculean effort led by a senior advisor in the Governor's office. There are numerous players at all levels of government that must coordinate in order to move forward with achieving the RPS goal and keeping electricity affordable and reliable.

Energy Governance in California

There are three primary players in energy at the state level, but the arena also features several other state entities, such as the California Air Resources Board, whose decisions affect the electricity system and numerous departments at both the federal and local level. Tribal governments also play a role in some instances.

California's three key energy organizations have different authorities and cultures – one is a regulatory body focused on electricity rates and adequate supply, one is a policy body whose focus is on efficiency and protecting the environment, while the third is a balancing authority whose primary focus is reliability. Each functions independently, but have overlapping responsibilities in certain areas, including planning for

transmission and future electricity system needs. These organizations include:

California Public Utilities Commission (CPUC). Created in 1911 to regulate railroads, in 1912 the CPUC was given jurisdiction to regulate privately-owned natural gas, electric and telecommunications companies. The scope of its responsibility is broad. It also regulates privately-owned water and transportation companies and authorizes video franchises. The CPUC ensures that regulated industries provide reliable service "at just and reasonable rates." It approves siting for transmission lines for investor-owned utilities and power purchase agreements for these utilities. In addition, it has authority in setting the rates, determining resource adequacy and measuring the utilities' success at achieving the Renewable Portfolio Standard. The five members of the commission are appointed by the Governor and confirmed by the Senate and serve staggered six-year terms. The Governor appoints one of the five members to serve as president. The commission is funded through reimbursements, surcharges and various special funds. The 2012-13 budget of nearly $1.4 billion included 1,040 positions.[37]

- ***Division of Ratepayer Advocates.*** Within the CPUC, the Division of Ratepayer Advocates is an independent arm that is responsible for representing consumers in commission proceedings. The division has a staff of 142 professionals, including engineers, economists, scientists and auditors with expertise in regulatory issues related to electricity, natural gas, water and telecommunications industries in California. The director of the division is appointed by the Governor and confirmed by the Senate. The division's budget for 2012-13 is $27.5 million.[38]

California Energy Commission (CEC). Formed in 1974, the CEC is the state's primary energy policy and planning agency. The commission is responsible for licensing solar thermal, geothermal, nuclear, natural gas and biomass power plants with peak capacity of 50 megawatts or larger, along with the transmission lines, fuel supply lines and the related facilities to serve them. The commission was designed, in part, in response to concerns that the CPUC's economic-based regulation did not consider environmental issues related to energy use. The commission forecasts energy needs and sets the state's appliance and building standards for energy efficiency. It also focuses on alternative fuel technology for vehicles. The five members of the commission are appointed by the Governor and confirmed by the Senate. Members serve five-year staggered terms. The Governor selects a chair and vice chair from among the members every two years. Four of the members must come from and represent specific areas of expertise including law,

environment, economics, and science/engineering. The fifth member represents the public at large. The commission's budget for 2012-13 is $384 million from special funds including a variety of assessments and some federal money. The commission has 612 positions.[39]

California Independent System Operator (CAISO). Created in 1996 as a non-profit public benefit corporation, the CAISO operates the wholesale power grid that serves about 75 percent of Californians, facilitates the spot market for power and also is involved in planning for electricity needs and transmission lines. It is overseen by a five-member board appointed by the Governor, (advised by a stakeholder search committee) and confirmed by the Senate. The CAISO operates outside of the executive branch and its activities are subject to oversight by the Federal Energy Regulatory Commission (FERC). Board members serve staggered three-year terms. The budget for CAISO in 2012 is $194.8 million, generated from fees charged to wholesale users of its systems and services.[40]

Other state entities that affect energy policy and planning include:

California Air Resources Board (CARB). The Air Resources Board creates air quality standards that influence the types of technologies the state uses to generate electricity and the location of electricity plants. Governor Arnold Schwarzenegger, through executive order, gave CARB the role of implementing a Renewable Energy Standard, although the Legislature later moved the RPS implementation to the California Energy Commission and the Public Utilities Commission. As part of its responsibility for enforcement of the federal Clean Air Act, CARB oversees 35 local and regional air pollution control districts. CARB also is the lead agency in implementing limits on greenhouse gas emissions as part of AB 32, the law that requires a reduction in greenhouse gas emissions to 1990 levels by 2020. CARB also is leading a study mandated by legislation enacted in 2009 (AB 1318) to evaluate electrical system reliability needs of the South Coast Air Basin in Southern California and to recommend the most effective and efficient means of meeting those needs while ensuring compliance with state and federal clean air laws. Additionally, in the 2011 Renewable Portfolio Standard legislation, CARB was given the authority to impose penalties on municipal utilities that do not achieve renewable energy targets.

California State Water Resources Control Board. The water board influences energy policy by enforcing water quality standards. There are two major activities underway that entwine energy policy – once-through cooling regulation and flow criteria for the Sacramento-San Joaquin River Delta ecosystem. As part of its responsibility for enforcing the federal Clean Water Act, the water board, in 2010, developed regulations that require shutting down or retrofitting 19 coastal power plants that use a cooling method of drawing in ocean water and circulating it

through heat exchangers and discharging it in the ocean. The process, known as once-through cooling, is harmful to fish by entraining sea life and by changing ambient water quality. The board has two advisory committees assessing the implementation of the once-through cooling regulations. To achieve the coequal goals of improved ecosystem health in the California Delta and water supply reliability, the board in 2010 developed new flow criteria which, if implemented, could affect how much and when water is released from California's dams. At issue is what levels of water flow are required to sustain ecosystem health. The timing and amount of water released to meet flow standards may intervene with the amount of water available to power hydro plants.

Department of Water Resources (DWR). As described earlier, because of its experience buying power for the State Water Project, California policy-makers gave DWR the authority to enter into and manage long-term electricity contracts on behalf of investor-owned utilities at the height of the 2000-2001 electricity crisis. The final contracts are expiring in 2015. The State Water Project is California's single largest consumer of electricity. The project's hydroelectric generators supply about 20 percent of the project's overall needs.

California Department of Fish and Game. The California Department of Fish and Game has a role in issuing permits setting conditions for harm caused to endangered species and their habitats when new power plants are proposed.

Additional Energy Governance

At the federal level, the Federal Energy Regulatory Commission, or FERC, licenses and inspects hydroelectric projects and regulates the California Independent System Operator. Other federal actors include the U.S. Bureau of Land Management, which issues permits for all energy projects on BLM lands, and the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers, which may become involved in environmental reviews for proposed power plants.

At the regional level, the Western Electricity Coordinating Council (WECC) is responsible for coordinating and promoting electric system reliability in the Western Interconnection, a service territory that includes the Canadian provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico and the 14 Western states in between.[41] The State of Washington has the largest hydroelectric capacity in the country while Wyoming and Montana are prime locations for wind farms. All are part of the WECC.

Once-Through Cooling Policy

In May 2010, the State Water Resources Control Board adopted a policy for the 19 electrical power plants (including two nuclear-fueled plants) in California that use marine or estuarine water as a cooling source. These power plant operators collectively draw billions of gallons of water every day to cool steam for generating electricity and then discharge the heated water back into the ocean or other body of water, a process known as once-through cooling.

The policy was enacted to comply with the federal Clean Water Act that requires cooling water intake structures to use the best technology available for minimizing adverse environmental impact. The 1972 Federal Water Pollution Control Act (amended in 1977 and now known as the Clean Water Act) addressed concerns regarding the environmental effects of once-through cooling, including the heated discharge into waterways and also the impingement and entrainment of marine life. In drawing water into a power plant, millions of fish, larvae, eggs, seals, sea lions, turtles and other marine life are killed either because they are trapped against screens or are drawn into the cooling system where they are exposed to high pressure or extreme heat.

Compliance with the federal regulation led to modified designs and operating procedures at new power plants and a shift to using re-circulating cooling systems. However, the 19 California plants affected by the board's 2010 policy are older, ranging from the oldest, a Redondo Beach facility established in 1948, to the newest, the Diablo Canyon Nuclear Power Plant brought online in 1985.

California's most recent consideration of the environmental effects of once-through cooling began in 2005, with the State Lands Commission and the Ocean Protection Council holding hearings and developing resolutions. In 2006, the Ocean Protection Council funded a six-month study to analyze options for each of the plants to convert to alternative technologies and urged the State Water Resources Control Board to implement the once-through cooling provision of the Clean Water Act.

The State Water Resources Control Board first issued a proposed statewide policy on once-through cooling in June 2006. Litigation at the federal level led to delays in developing the policy. Meanwhile, the board contracted for a study on the effect of once-through cooling policy on the electricity grid. As water board staff resumed developing the policy, they met regularly with representatives of the California Public Utilities Commission, the California Energy Commission and the California Independent System Operator. The adopted policy requires the 19 power plants to reduce their use of seawater for cooling by 93 percent. Power plant operators can choose how they plan to comply, either by reducing intake by 93 percent, or, if that option is not feasible, by implementing design changes. Since adopting the policy, three of the 19 plants have either shut down or been replaced by a power plant that does not require once-through cooling.

The policy set timelines for compliance and also required the water board to establish the Statewide Advisory Commission on Cooling Water Intake Structures, charged with ensuring that implementation plans and schedules submitted by the owners of the 17 non-nuclear plants are realistic and will not affect electric grid reliability. The advisory commission annually reports to the board any recommendations for changes to the implementation schedule. The water board has a separate review committee for the nuclear-powered plants.

In July 2011, the water board extended the compliance period for six of the nine units within the three plants owned and operated by the Los Angeles Department of Water & Power by periods from four to 16 years and reduced the compliance period for three other units.

The advisory commission adopted its first report in March 2012 and recommended the water board allow plant owners to comply on a unit by unit basis, which would align with the amendments agreed upon for the Los Angeles Department of Water & Power. The advisory commission reviewed the plans the generators submitted that detailed how they would comply with the once-through cooling regulations, but did not make any recommendations to extend compliance deadlines. The advisory commission indicated it would address potential compliance schedule changes in its 2013 report, if changes are required to meet local, zonal or system reliability needs.

Sources: State Water Resources Control Board. Fact Sheet. "Once-Through Cooling Policy Protects Marine Life and Insures Electric Grid Reliability." Also, State Water Resources Control Board. July 19, 2011 "Board Meeting Session – Division of Water Quality. Item 7." Also, "Report of the Statewide Advisory Committee on Cooling Water Intake Structures." September 2011 and March 2012. Also, California's Clean Energy Future. December 23, 2011 "Once-Through Cooling Phase-Out."

At the local level, California's 46 municipal utilities supply approximately one-fourth of the state's electricity that is not transmitted on the California Independent System Operator grid.[42] Most of the municipal utilities are relatively small, though two are among the state's largest utilities. Los Angeles Department of Water and Power is the state's third-largest utility overall and the largest municipal utility in the country. The Sacramento Municipal Utility District is the fifth-largest utility in California.[43] These public utilities, either independently or through joint powers agreements, control transmission grid operations through several balancing authorities that are independent of the California Independent System Operator.

Getting the Job Done: Kern County Renewable Energy

Kern County has been a pioneer in developing new energy sources since the 1890s so it comes as no surprise that it is leading the charge to site and develop renewable energy as California utilities move toward achieving the state's Renewable Portfolio Standard goal. In 2011, the Kern County Board of Supervisors adopted a goal to be home to 10,000 megawatts of renewable energy by 2015. By the fall of 2011, Kern County had 3,900 megawatts of wind and solar photovoltaic power in production, an additional 1,875 megawatts approved and moving into construction and another 3,000 megawatts in the review process.

Kern has achieved its success, in part, because it is rich in renewable resources: Its sunny climate is a magnet for solar energy plants and the Tehachapi Pass is one of the largest wind resources in California. The world's largest wind farm, the Alta Wind Energy Center, is currently under construction in the county. When fully functional, Alta will have the capacity for producing 1,500 megawatts, enough to power 1.1 million homes. Another 1,200 megawatts of wind-powered capacity was expected to come online in 2012. The county also approved 1,200 megawatts of solar projects in 2011 with plants located in both the Central Valley and the West Mojave Desert.

Although having abundant renewable resources is important, equally key to the success of renewables in Kern County is its proactive planning -- Kern includes an energy element as part of its General Plan and adopted a Wind Energy Zone to expedite permitting projects under the California Environmental Quality Act. The county worked for a decade to get the Southern California Edison Tehachapi Renewable Transmission Project approved to transmit the new renewable energy resources, which provided the certainty energy producers needed to invest in Kern County. The county also expedited the review process for solar projects by streamlining zoning ordinances for ground-mounted solar panels and provided concurrent processing of Environmental Impact Reports.

Kern County projects that implementing the 10,000 megawatt goal will drive the creation of 8,000 construction jobs, 1,500 operational jobs and up to $25 billion in investment in Kern County.

Source: Lorelei Oviatt, Director, Planning and Community Development, Kern County. Written testimony to the Commission. September 27, 2011. Also, http://pcd.kerndsa.com/planning/renewable-energy. Website accessed November 7, 2012.

Local and tribal governments often influence energy decisions, particularly in permitting and siting power plants and transmission lines. City, county and tribal governments are the permitting authority for electricity generators under 50 megawatts and for any non-thermal power generation, which can include photovoltaic solar and wind plants. As renewable energy plants grow as a percentage of the state's overall energy portfolio, the role of local authorities also grows. Additionally, as distributed generation increases, such as rooftop solar and small wind turbines, local officials in planning and public works departments, planning commissions, boards of supervisors and city councils will be more involved in siting and permitting.[44]

California's 35 local air pollution control districts and air quality management districts also have a role in energy siting. These county and regional governing authorities have primary responsibility for controlling air pollution from stationary sources, including power plants. These districts can affect when and where power plants can be built in California.

Not only are there many players in California's energy system, there also is a dizzying array of ongoing, sometimes competing and sometimes duplicative processes that relate either directly or indirectly to the Renewable Portfolio Standard.

Government Processes

Regulating energy generation and distribution and planning for the state's needs are public functions requiring hearings, roundtables, workshops and comment periods and regular reporting and updates. Each of the state's energy-related entities is involved in a number of often overlapping public processes at any given time.

Beyond the specific dockets at the California Energy Commission for energy plant siting and the dockets at the California Public Utilities Commission for rate cases, power purchase agreements and transmission siting, the CEC, CPUC, the CAISO and other organizations have a variety of ongoing public planning processes. The table describes some of the major processes that are specifically related to or may significantly influence implementation of the Renewable Portfolio Standard.

Government Processes Affecting RPS Implementation

California Energy Commission
Integrated Energy Policy Report (IEPR). The CEC is required by statute to prepare a biennial integrated energy policy report that includes an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources, protect the environment, ensure reliable, secure and diverse energy supplies, enhance the state's economy and protect public health and safety.[45] In 2012, the CEC used the IEPR development process to follow up on work conducted in 2011 and to comply with a directive from Governor Brown to develop a renewable energy action plan. The commission held multiple public workshops to inform its report. A draft report was issued in October 2012 and the final report likely will be adopted in early 2013.
Renewable Portfolio Standards Proceeding. The Renewable Portfolio Standard legislation enacted in 2011 directed the commission to adopt regulations specifying procedures for enforcement of the RPS for municipally-owned utilities. The legislation requires the commission to certify and verify eligible renewable energy resources for publicly-owned utilities and to monitor compliance with the RPS.
Desert Renewable Energy Conservation Plan (DRECP). The Desert Renewable Energy Conservation Plan was established by Governor Schwarzenegger to protect and conserve desert ecosystems while allowing appropriate development of renewable energy projects. The DRECP was initiated by a planning agreement among the California Department of Fish & Game, the California Energy Commission, the U.S. Fish and Wildlife Services and the U.S. Bureau of Land Management. The DRECP development process also includes independent science advisors.
California Public Utilities Commission
Renewable Portfolio Standard Rulemaking for Investor-Owned Utilities. Through its rulemaking process, the CPUC sets the Renewable Portfolio Standard targets for investor-owned utilities. It also determines compliance with those targets for these utilities. The commission also establishes the standard terms and conditions used by the IOUs in the renewable energy contracts and reviews the contracts for eligibility in meeting the Renewable Portfolio Standard.
Renewable Portfolio Standard Rulemaking for Cost-Containment Mechanism. The renewable portfolio standards legislation, SBX1 2 (Simitian), also included a cost-containment mechanism to ensure that the procurement of renewable resources does not result in "disproportionate rate impacts" to electricity customers. In 2012, the CPUC began the process of determining limits for procurement expenditures. Once the CPUC determines what the cost limitation will be, should an investor-owned utility hit the cost limit, the utility can "suspend procurement unless procurement can proceed without exceeding a de minimis increase in rates."[46]
Long-Term Procurement Plan Proceeding (LTPP). Every two years the CPUC holds a Long-Term Procurement Plan Proceeding to review and adopt the investor-owned utilities' 10-year procurement plans. The LTTP proceeding evaluates the utilities' need for new resources and establishes rules for rate recovery of procurement transactions.
Resource Adequacy Program. The CPUC requires all of the entities within its jurisdiction – investor-owned utilities, direct access providers and community choice aggregators – to procure sufficient supply capacity, together with a 15-17 percent reserve in case the California Independent System Operator needs to dispatch additional real-time resources to instantaneously increase power supplies.
California Independent System Operator
Transmission Planning Process. A core responsibility of the CAISO is to plan for the timely and cost-effective upgrading and expansion of the transmission it operates, using a 10-year time horizon. The annual transmission planning process is open and actively engages stakeholder and public input. Meeting the state's goal of 33 percent renewable energy, the phase out of the once-through cooling generation, the CEC energy forecast as well as various other issues are factored into the transmission planning process.

Government Processes Affecting RPS Implementation

California Air Resources Board
Electrical System Reliability Needs of the South Coast Air Basin (AB 1318). Legislation enacted in 2009 (AB 1318) requires the Air Resources Board, in consultation with the California Energy Commission, the California Public Utilities Commission, the California Independent System Operator and the State Water Resources Control Board to conduct a one-time study that evaluates the electrical system reliability needs of the South Coast Air Basin in Southern California. Los Angeles Department of Power and Water also is heavily involved with the study. The study, using a 10-year time horizon, will assess the 33 percent Renewable Portfolio Standard, once-through cooling regulations and fossil fuel resources required to offset intermittency challenges. Once the need is determined, recommendations will be made on emissions offsets.[47]
Federal Energy Regulatory Commission
California Transmission Planning Group. The Federal Energy Regulatory Commission requires a local and regional transmission planning process "that is coordinated among affected entities and that is open to stakeholders." In 2009, the California Transmission Planning Group was formed by transmission owners and operators and has focused on identifying any transmission infrastructure additions that may be required to achieve California's renewable portfolio standard. The group adopted a transmission plan in February 2012.[48]
Western Electricity Coordinating Council
Regional Transmission Expansion Planning Project. The 14 Western states, the Western Canadian provinces and the northern portion of Baja California, Mexico, that make up the Western Electricity Coordinating Council in 2010 began a stakeholder process to evaluate long-term regional transmission needs that factor in variables such as electricity demand, generation resources, energy policies, technology costs, impacts on transmission reliability and emissions. The process is managed by the Transmission Expansion Planning Policy Committee, made up of representatives of states and provinces, utilities, non-governmental organizations, energy developers and consumer advocates.[49]

Collaborative Efforts Help Achieve the RPS Goals

The 2000-01 energy crisis forced cooperation among California agencies to synchronize energy planning and speed infrastructure development. Collaborative efforts have continued among an ever larger assortment of agencies as California has pursued its renewable energy targets.

The foundational effort, known as the Energy Action Plan, was developed in 2003 by the CEC, CPUC and now-defunct Consumer Power Authority. The Energy Action Plan established goals and actions for adequate, reliable and reasonably priced electrical power and natural gas supplies. The agencies updated the plan in 2005.

The Energy Action Plan process was absorbed into the Energy Commission's Integrated Energy Policy Report (IEPR), which the Legislature requires every two years. The IEPR provides an assessment

of energy supply, demand, production, transportation, delivery, distribution and price.

Paul Clanon, executive director of the California Public Utilities Commission, in testimony to the Commission, credited the Commission's 2005 hearing on Governor Schwarzenegger's proposed Department of Energy reorganization – and the threat of consolidation – for prompting key agencies to improve their coordination of activities, to now include monthly meetings in the Governor's Office.

To address the need to plan transmission for new renewable power supplies, in 2007, the CEC, the CPUC, the CAISO, and California's municipally-owned utilities launched the Renewable Energy Transmission Initiative (RETI), which brought together a 30-member stakeholder collaborative including state, federal and local agencies, Native American tribal representatives, investor and publicly-owned electric utilities, renewable generation developers, ratepayer advocates, environmental organizations and others not traditionally included in transmission planning. The goal was to develop a conceptual statewide transmission plan that minimizes environmental impacts and economic costs and supports California's 33 percent Renewable Portfolio Standard.

Although the RETI process has no legal standing, its work product is used to influence and inform the formal processes and procedures related to renewable energy infrastructure planning and permitting. RETI results, for example, have been influential in identifying transmission upgrades that would best serve renewable development and helped identify cases where duplication of transmission proposals by investor and municipal utilities both increased costs and environmental impacts.[50] The work of the stakeholders is documented in two reports issued in 2009 and a third report issued in 2010 and has been used to inform the various other transmission planning processes.[51]

The Schwarzenegger administration designed an overlay network, in which the Air Resources Board, the California Energy Commission, the California Public Utilities Commission, the California Environmental Protection Agency and the California Independent System Operator worked together to develop the Clean Energy Future Implementation Plan, released in September 2010. As part of this effort, the CAISO developed an extensive Gantt chart that guides 50 interrelated activities through each agency's own approval and licensing responsibilities.

Most recently, the Renewable Energy Action Team has been instrumental in shepherding new large-scale renewable energy projects through numerous federal, state and local permitting processes. The Renewable Energy Action Team (REAT) began as a working group of the U.S. Bureau of Land Management, the U.S. Fish and Wildlife Service, the California Energy Commission and the California Department of Fish and Game.

According to Michael Picker, the Governor's senior advisor on energy, "The agencies sat down to identify studies and reports that they would

Improving Planning to Protect the Environment and Expedite Permitting

To accelerate development of new renewable energy plants, policy-makers have recognized that better planning and coordination could lead to expedited power plant siting and permitting, particular in California's sensitive habitat areas, such as the Mojave desert and rich agricultural lands in the Central Valley.

The Desert Renewable Energy Conservation Plan, begun in 2009 under Governor Arnold Schwarzenegger, brought together the California Energy Commission, the California Department of Fish & Game, the U.S. Bureau of Land Management and the U.S. Fish and Wildlife Service. Together, and with input from local government officials and other stakeholders, they would develop a plan that would protect and conserve desert ecosystems by identifying appropriate land for development of large-scale renewable energy projects.

The planning process included an independent science panel to provide recommendations for "avoiding, minimizing, and mitigating adverse ecological impacts and contributing to the conservation of imperiled native species while accommodating energy development in appropriate areas." In 2012, the independent science panel reviewed draft documents and procedures through June 2012. In initial recommendations issued in an August 2012 review of the draft plan, and a subsequent review draft released in September 2012, the independent science panel raised concerns about the scientific quality of DRECP products and processes. The panel urged "immediate and significant course corrections."

Based on the scientists' and stakeholders' feedback, officials have indicated an informal draft of the plan will be submitted for public comment and will be the subject of a workshop in early 2013, before a formal plan and environmental impact report is introduced. The process has highlighted how difficult it may be to site large-scale solar in the California desert.

Environmentalists have recommended the state build on the lessons learned through the DRECP process, and initiate a new focus on potential sites in the Southern San Joaquin Valley. This area, encompassing Fresno, Kern, Kings, Madera and Tulare counties, is home to some of the best agricultural land in the world but also is intensely coveted by solar energy plant developers because of its abundance of sunshine. The west side of the valley is home to the Westlands Water District, encompassing more than 600,000 acres of farmland. This land has severe drainage problems resulting in soil that is less than ideal for growing crops. Drought, along with reduced and less reliable water deliveries, have farmers looking for new economic uses for their land on low-value, low-conflict areas and degraded agricultural lands.

A coordinated, regional land-use planning process for renewable energy plants in the Southern San Joaquin Valley could help expedite siting and permitting of new renewable energy plants that will help the state achieve its Renewable Portfolio Standard goals.

Sources: Desert Renewable Energy Conservation Plan website www.drecp.org. Website accessed November 9, 2012. Also, David S. Harlow, Director, Desert Renewable Energy Conservation Plan. October 10, 2012. "Letter to Stakeholders and Working Group Members." Also, DRECP Independent Science Advisors. October 2010. "Recommendations of Independent Science Advisors." Also, Independent Science Panel, Desert Renewable Energy Conservation Plan. August 2012. "Initial Recommendations of the Desert Renewable Energy Conservation Plan Based on Review of Draft DRECP Materials," and September 2012. "Review Draft: Independent Science Review for the California Desert Renewable Energy Conservation Plan. Also, Defenders of Wildlife. 2012 "Smart from the Start: Responsible Energy Development in the Southern San Joaquin Valley."

need in common to make regulatory decisions and to issue licenses and permits, developed a calendar that guaranteed a decision within the timeline required for large renewables projects to break ground and get federal stimulus dollars and met weekly to deal with problems."[52] The Renewable Energy Policy Group, which includes a representative from the Governor's office and the U.S. Office of the Interior, monthly convened the members of the REAT and the 20 largest renewable energy developers to identify problems. Members of the REAT were then directed by the Governor's representative and the Interior Secretary's representative to solve the problems. Leaders from the CPUC and the CAISO were brought in as needed, particularly when transmission permitting issues arose.

As a result of this effort, of the 21 largest projects tracked by the team, permits for 5,200 megawatts of renewable electricity capacity had been issued by December 2010 and permits for another 2,300 megawatts of renewable energy capacity had been issued by fall 2011.[53] As of October 2012, the Renewable Energy Action Team had more than 400 plants under review, totaling 33,052 megawatts of renewable energy, two-thirds of which were solar photovoltaic plants.[54]

The unanticipated outage of the San Onofre nuclear plant in Southern California in January 2012, described in greater detail later in this report, also spurred unusually swift cooperation among numerous entities to come up with a solution to fill the gap the outage created both in terms of electricity wattage and voltage support. The plant was taken offline after a small leak of radiation steam was detected. It later was determined that there had been significant wear in the tubing in the reactors. With the outage lasting indefinitely, the California Independent System Operator, the California Energy Commission, the California Public Utilities Commission, the Air Resources Board and the South Coast Air Quality Management District worked together quickly to implement a plan to restart two shuttered plants in the region, speed completion of a key transmission line and ramp up conservation strategies in time for summer, when energy use peaks each year.

Although cooperation and communication have improved tremendously since the Commission was presented with an energy reorganization plan in 2005, concerns remain regarding the costs and reliability of electricity as these numerous organizations attempt to implement the Renewable Portfolio Standard simultaneously with other major energy-related policies. The following chapter describes the Commission's concerns in greater details.

Adding It All Up

The day after the Legislature enacted the California Renewable Energy Resources Act in March 2011, State Senator Mark Wyland, who also is a member of the Commission, asked the Little Hoover Commission to "evaluate deficiencies in structures, organization and operations to make recommendations that are critical to move the state's climate change and renewable energy goals forward."

The Commission held two public hearings in September and November of 2011 that focused on energy governance. Multiple witnesses told the Commission that despite what several described as a dysfunctional organizational structure, California's electric utilities generally are on track to achieve the Renewable Portfolio Standard goal of 33 percent by 2020. In his testimony, witness Paul Clanon, executive director of the California Public Utilities Commission, acknowledged that the state's governance structure for energy policy is imperfect. "Nobody would start off by designing it that way," he said. "We're the leader (in renewable energy) despite the fact that it's hard to explain what we do."

Most agreed that reorganization just now likely would disrupt the progress that has been made toward meeting the state's renewable energy policy goals. Such a reorganization effort likely would bring litigation and create additional uncertainty that would make it more difficult to attract financing for renewable projects. Over the course of the hearings and subsequent meetings, the Commission heard concerns about future electricity costs and reliability as the state's public and private utilities attempt to achieve the renewable goal, at the same time the state implements several other significant environmental policies. The most important, and most far-reaching, of these are the state's greenhouse gas emission reduction program and clean water policies that affect coastal power plants and potentially hydroelectric plants, all of which will have an effect on the electricity system.

The aggregated cost of achieving California's connected energy and environmental policy goals – to households and businesses – is not clear. Nor is it clear the degree to which meeting renewable power targets while maintaining reliability will come at the expense of greenhouse gas reduction goals.

Electricity generation from solar panels and wind turbines is intermittent. As the sun sets and the wind dies, these generating resources require back-up power, typically gas-fired plants that can ramp up quickly to replace the renewable resource on short notice. There is significant complexity in balancing the portfolio so that electricity remains reliable and affordable and utilities do not over-invest in new fossil-fuel plants that will detract from the greenhouse gas reduction goals.

In addition to the Renewable Portfolio Standard, the state also is implementing several other major policies that affect its electricity system:

- The Global Warming Solutions Act of 2006, (AB 32 – Nunez) requires rolling back greenhouse gas emissions to 1990 levels by 2020. The law, along with other state and federal air regulations, affects the operation and siting of power plants.
- The State Water Resources Control Board once-through cooling regulations on water used by many coastal power plants will require 19 plants, including the state's two nuclear power plants, to either shut down or re-tool in the next decade.
- Governor Brown has set a goal that 12,000 megawatts of renewable energy come from distributed generation – local energy sources such as rooftop solar and small scale wind turbines.
- The State Water Resources Control Board is preparing flow criteria for Delta ecosystem sustainability, which potentially will influence operations of California's hydroelectric plants.

Some of these policies have been adopted to address significant environmental concerns – in some cases, decades-old clean air and water problems and mandates to comply with federal laws. In this review, the Commission's concern is not with enacted policies or stated goals, but rather with implementation: This ambitious agenda is being pursued by a symphony of government entities without the benefit of a conductor to lead or direct. The Commission's concern is that, lacking coordination and proper sequencing of the many steps to implementing these policies, California may fall well short of its goals, or worse, unnecessarily increase costs and put system reliability at risk.

Unlike other states, California has a peculiar tripartite governance structure for regulating how electricity is generated, distributed and sold, with authority spread among the California Energy Commission, the California Public Utilities Commission and the California Independent System Operator. The California Air Resources Board also has

considerable influence over California's energy system, especially any generation from carbon-based fuel. Each organization has important functions, but no one organization has full authority or responsibility for ensuring that California's electricity system is reliable and affordable.

Throughout the Commission's public hearing and study process, no witness or government official has been able to provide the assurance that implementing all of these policies simultaneously will leave Californians with affordable and reliable power. Californians deserve greater clarity and predictability as these environmental policies are implemented. Such clarity and predictability only can improve the process and maximize California's progress in meeting the broad array of goals it has set for itself.

As it pursues its energy goals, it is not clear whether California will achieve its environmental policy goals, as there is no single entity in the state looking at the system as a whole, and ensuring the environmental policies linked to energy are implemented in concert. Energy and environmental goals have been enacted in a piecemeal fashion over time, not as part of a considered, integrated strategy. As a result, priorities are not clear. No roadmap exists.

Blazing the trail on energy policies creates a significant burden to succeed. Should energy costs unexpectedly escalate or energy becomes unreliable, California will jeopardize not only its own environmental stewardship goals, it will put the state's economy at risk and jeopardize support for renewable energy in other states and other countries as well.

Bob Foster, mayor of the City of Long Beach and chairman of the California Independent System Operator told the Commission in testimony, "if we fail, we will impair renewables across the country for some time."[55]

Costs: How Much Green Will It Take to Go Green?

Though the Commission's initial focus in this study was on the governance structure, the Commission's concern shifted to include costs and reliability as it heard from various witnesses as part of its public hearing process.

Californians already pay almost a third more for their electricity than the national average. The state ranks 11th in electricity rates, with an average cost of 13.02 cents a kilowatt hour, compared to a national average of 9.7 cents.[56]

The cost of renewable energy traditionally has exceeded the cost of energy produced by plants powered by fossil fuels. Its advocates point to its benefits, including greater energy autonomy from outside suppliers and lower greenhouse gas emissions and air contamination. Though the sunlight and the wind that power some of the renewable plants are free resources, the construction costs drive up the overall costs per kilowatt hour, as does the cost of new transmission required to deliver the power to customers and the cost of back-up power.

But costs may be falling as new technology makes solar generation more efficient. In 2011 and 2012, the cost of solar photovoltaic panels dropped sharply, creating a market opportunity for the investor-owned utilities to enter into contracts to purchase renewable power at significantly lower costs. How this will affect electricity rates for consumers is unclear as details on these and earlier contracts are kept secret for three years.

The CPUC in a February 2012 report indicated that 2011 bids for the power purchase agreements showed "significantly lower costs than bids from the past few years, which will be reflected in future IOU contacts."[57] The report is the first such disclosure following the 2011 passage of SB 836 (Padilla) requiring annual reporting on aggregate costs of renewable contracts. The report indicates the average bid price from the 2011 solicitation for power purchase agreements was 30 percent lower than the average bid price from the previous solicitation in 2009.[58] According to the report:

> "*The weighted average time-of-delivery adjusted cost of all contracts approved from 2003-2011 was approximately 11.9 cents per kilowatt hour, with a range of 5.4 cents in 2003 to 13.3 cents in 2011. Most recently, bids from the 2011 RPS Solicitation, not yet available for inclusion in the report, show significantly lower costs than bids from the past few years, which will be reflected in future IOU contracts.*"[59]

In the rush to meet the 2020 goal, however, California utilities locked in long-term power purchase agreements, in some cases at peak price levels. Between 2002 and 2011, the CPUC approved more than 200 contracts for more than 18,500 megawatts of renewable capacity for the investor-owned utilities.[60] As a result, their customers may not benefit from lower costs as renewable energy technology matures and prices potentially decline.

At the same time new technology holds the potential to reduce renewable energy costs, plunging natural gas prices are sharply lowering the cost of electricity produced by modern gas-fired plants. For now, this has

reduced the ability for new solar technology to narrow the price differential between renewable power and conventional power.

Californians are a few years away from learning how these contracts will influence electricity bills when the bulk of the approved projects come online and the CPUC sets rates for the investor-owned utilities based on these contracts. Some participants in the CPUC process, however, including the CPUC Division of Ratepayer Advocates and one CPUC member, have publicly questioned the cost of some of the contracts.[61]

In February 2011, the CPUC Division of Ratepayer Advocates released a report indicating that the CPUC was approving virtually every renewable contract, regardless of the cost. The report said the division was "concerned that the perceived urgency to comply with the RPS and continuing CPUC approval of high-priced contracts has created an inelastic demand and subsequently driven the renewable market to yield very high prices."[62] The report found that the "CPUC has approved nearly every renewable contract filed by the utilities, even when they rate poorly on least-cost, best-fit criteria."[63]

In its January 2012 annual report, the Division of Ratepayer Advocates reiterated these concerns, stating that "DRA supports PPAs (power purchase agreements) as a way of meeting the RPS (renewable portfolio standard) goals but is concerned that the abundance of overpriced contracts approved by the CPUC in 2011 will have adverse effects on the renewable market and will result in unnecessarily higher utility bills for customers."[64]

One consequence of the rush to implement the Renewable Portfolio Standard could be consumer anger that may erupt if a "rate impact bomb" explodes in 2015 or 2016 and consumers begin paying for the electricity generated by the new renewable plants now under development.

Concern about such an outcome prompted a May 24, 2012, dissent on a power purchase agreement from CPUC Commissioner Michel Florio, who wrote:

> *If we do not contain costs for ratepayers, we risk a potential backlash when the costs of these contracts finally come in at the middle of this decade. The "Rate Impact Bomb" is lingering on the horizon and we cannot allow that bomb to go off. If we want to contemplate a RPS future that goes beyond 33 percent, we have to ensure that the current requirements are economically sustainable for California ratepayers. I want to go beyond 33 percent, but we will not be able to do that if we break the bank beforehand.*

Renewable energy, in the short term, will translate into higher electricity rates for consumers. In the long run, renewable energy may provide a hedge to insulate California from the volatility of fossil fuel prices that fluctuate in response to global demands.

Japan, for example, is shifting from nuclear power to natural gas in the wake of the earthquake and tsunami that ravaged the Fukushima Daiichi nuclear power plant in 2011. Because it produces only 4 percent of the natural gas it consumes, Japan is looking to import natural gas. As demand increases from Europe and other parts of Asia as well, officials expect the U.S. to become a net exporter of natural gas.[65]

Some have suggested that it is not possible to assess future energy costs. Too many variables are involved: fluctuating natural gas prices, the role of fracking, declining costs of renewable energy technology and the interplay of growing renewable power supply on gas prices. Expanding renewable energy, for example, may continue to suppress already low natural gas prices.

Energy efficiency policies also affect demand. Rules and policies developed by the California Energy Commission have kept California's per capita electricity consumption flat for more than three decades, even as per capita consumption has climbed nationwide.

The tools exist to analyze these issues, as well as the uncertainties involved. What has been lacking is the political will. The point of such an analysis would be to shed light on how different paths to implementation influence costs and outcomes. The goal is finding a path that achieves the state's energy and environmental goals while avoiding unnecessary costs.

It is important to note that others have predicted that Californians would pay more for electricity in 2020 even in the absence of the Renewable Portfolio Standard. California's electricity infrastructure is aging and new power plant technologies, not only for renewable energy plants, but for cleaner and more efficient fossil fuel-based plants, are being added to the grid. These new plants replace aging, less efficient plants. The majority of the non-nuclear "Eisenhower Era" power plants affected by the water board's once-through cooling regulations, for example, were built 50 years ago and run at 15 percent of their capacity or less because the power they generate is comparatively expensive.[66] They do, however, provide the baseload for peak summer energy demand, particularly in Southern California.[67] California's transmission and distribution systems also must be modernized to address the growing demand for distributed generation, smart meter technologies and electric vehicles.

In developing the RPS legislation, lawmakers acknowledged the potential for rate shock and attempted to create a cost cushion for consumers. To reach the goal of 33 percent renewable energy by 2020 without exorbitantly increasing customers' rates, the legislation included a requirement that the CPUC develop a limit for RPS procurement expenditures. At this point, it is not clear how the mechanism might work. The CPUC in 2012 began a proceeding to develop guidelines for this limit.

Will the Lights Stay On?

Reliability is no small issue in a state that endured rolling blackouts in 2000 and 2001, when flawed energy deregulation led to energy market gaming, lasting rate hikes and the recall of Governor Gray Davis.

If achieving the RPS requires new capital investment, given concerns about reliability, it also may require investment in back-up generation. Investments in new "peaker" plants – those that can come online quickly to replace sudden loss of electricity from a solar or wind plant – will be costly. Such plants are typically natural gas-fired plants, which may detract from the state's ability to achieve its greenhouse gas emission reduction goals, though they will be far cleaner than the state's older generation plants. On this point, Californians should be able to understand how much this back-up power will cost and to what degree will it delay or detract from the state's goal to reduce greenhouse gas emissions, or to meet regional clean air requirements.

Intermittency: Sunrise Surges, Sunset Shutoff and the Wait for Wind

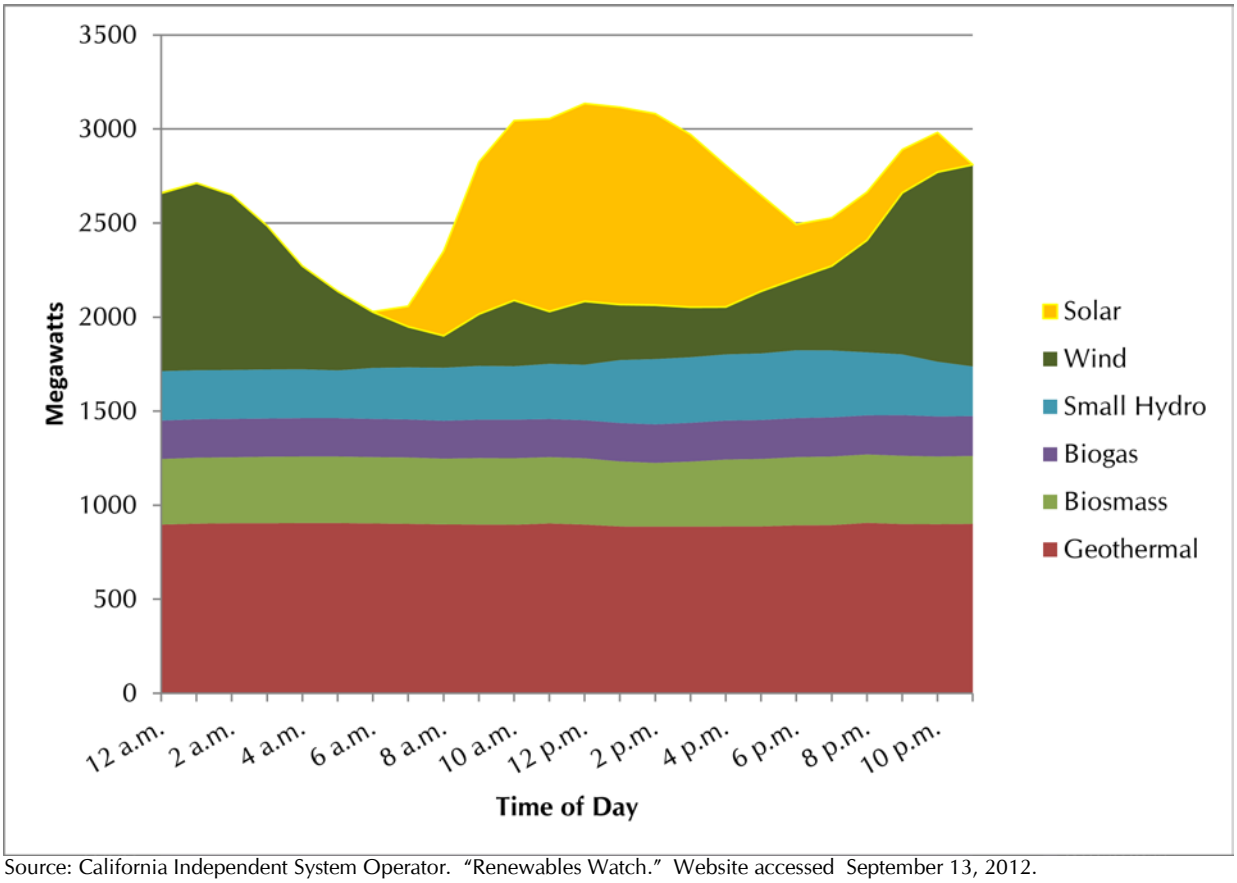
Solar power supplies surge at sunrise, then plummet at sundown. Solar power generation also can be heavily influenced by overcast and by moving clouds. Wind power surges at night, when energy use is low, creating a period of high renewable power availability during a period of low demand. At present, affordable technology to store large amounts of surplus wind energy produced at night does not yet exist.

The intermittent nature of solar and wind renewable power presents a challenge for the balancing authorities, who must ensure adequate electricity is available. No one organization in the state has the authority to address the issue head on. The California Independent System Operator and the California Energy Commission identify electricity needs and the California Energy Commission also has some authority to approve sites for power generation, though neither organization can force investments in electricity plants, or, for that matter, investments in

transmission. Strictly speaking, the solution also is beyond the scope of the California Public Utilities Commission, which regulates electricity rates. Through its actions, however, the CPUC signals the market on what proposals are likely to be successful.

If the state is to meet its power needs, as well as meet its renewable power goals and comply with clean air regulations, California may need to expand new clean-technology fossil fuel plants that can quickly ramp up to cover periods of low renewable power production. This contingent fossil fuel power capacity is an understood requirement of making renewables a significant part of California's energy portfolio. Yet it is a cost that is considered separately from the cost of a renewable power plant. When approving power purchase agreements, regulators should place a greater emphasis on the overall cost of a project, given the cost of addressing intermittency issues. Geothermal, biogas, biomass and small hydro powered plants all provide clean renewable energy without the daily intermittency challenges of solar and wind power. While these types of plants can be more costly upfront, especially considering the recent drop in the price of photovoltaic solar panels, they do not require back-up plants.

Hourly Breakdown of Renewable Resources
For Operating Day September 13, 2012



Source: California Independent System Operator. "Renewables Watch." Website accessed September 13, 2012.
http://www.caiso.com/market/Pages/ReportsBulletins/DailyRenewablesWatch.aspx

Balancing Act

California struggles to ensure it has enough resources to meet electricity demand without authorizing resource expansion that may lead to "stranded resources," or power plants that have more capacity to generate power than can be sold to the utilities. Some balancing authorities, such as the California Independent System Operator, whose primary mission is to ensure adequate electricity, worry about having enough capacity. Others, meanwhile, are concerned that the state has adequate capacity and is not placing enough emphasis on future energy efficiency and expanded demand response capacity in long-term planning scenarios. They fear that California will authorize additional gas-fired plant capacity, which will lead to unnecessary costs and environmental impacts.

Differing projections of California's electricity capacity needs by various state organizations create market uncertainty, potentially stalling or discouraging private investment in power plants and needed transmission lines.

This uncertainty has a cost. Calpine, one of the nation's largest utility plant operators, threatened in early 2012 to shutter a decade-old Sutter County gas-fired power plant because it lacked demand for the plant's 578 megawatts of electricity supply. The California Independent System Operator sought to preserve the plant to meet future capacity requirements. It hoped to avoid the need to re-power a shuttered plant, which can be difficult and sometimes impossible.

To that end, the California Public Utilities Commission identified a strategy to keep the plant in operation for the time being, essentially requiring the investor-owned utilities, and ultimately their customers, pay to keep the plant available for potential future capacity needs.

A dissenting opinion of PUC Commissioner Mark J. Ferron points to how failure to integrate current planning processes taking place before different commissions and boards creates critical gaps in the system:

> *The problem facing the Sutter plant is system wide: it appears we may have a "hole" in our market and planning structure whereby there are insufficient economic incentives for generating plants which provide useful flexible attributes to cover the cost of maintaining these plants in operation. I believe that the Commission, in consultation with the CAISO, needs to immediately work to create a coordinated approach across our own Resource Adequacy and Long Term Procurement Planning Procedures and*

> *the CAISO's system and reliability planning process to address this market shortcoming.*[68]

Opponents to building more fixed capacity argue that CAISO's planning scenarios have not sufficiently factored in increased future energy efficiency and demand response. As a result, they say CAISO has projected a greater need to procure additional electricity capacity than may be necessary.[69] In doing so, it may be adding to overall system costs. In comments submitted to the CPUC as part of its Long-Term Procurement Planning Process, the Sierra Club, Union of Concerned Scientists and Earthjustice wrote:

> *…we have more than enough pieces to provide reliable electric services – we just need to find the best way to fit those pieces together. As Sierra Club and others have highlighted in previous comments, should the next stage of analysis demonstrate a system operational need, the Commission, IOUs and CAISO should explore operational solutions rather than simply adding more capacity to a system that already has surplus capacity. Using existing resources in a more sensible way promises to be cheaper for utility customers and more consistent with State policies than procuring new fossil-fueled resources.*[70]

Unintended Consequences of Legislative Trade-Offs

Some have suggested that a major cost driver of future electricity rates and reliability is not the renewable energy goal itself but rather trade-offs made along the way over the course of years of contentious negotiations. The trade-offs introduced requirements into law that may create unintended consequences – including higher-than-necessary costs, according to some. Specifically, the 2011 Renewable Portfolio Standard legislation created three categories of renewable energy credits for utilities to use as they scored their renewable fuel portfolio, the so-called "buckets" that count toward achieving the RPS goal

The buckets determine to a large degree where renewable energy consumed in California can be produced. By 2020, 75 percent of renewable energy used to qualify for the RPS goal in California must come from the first category and no more than 10 percent can come from the third category.

The three categories favor in-state production over potentially cheaper renewable energy produced within the Western Electricity Coordinating Council, which is composed of all the Western States and two western provinces in Canada, but outside of California. Some contend that this

preference needlessly increases costs, limits renewable energy imports and exports for California and reduces reliability.

In written testimony to the Commission, one energy industry consultant concluded that "limiting the imports of more cost-effective renewable resources could result in additional costs in excess of hundreds of millions of dollars per year, costing ratepayers billions of dollars over the life of the RPS program."[71]
At its February 2012 hearing, the Commission was told that California's "ability to optimize how our grid works to reduce the integration costs and generation costs of renewables that we utilize will depend on us participating in a broader energy market across the West."[72]

Another witness testified that there are significant wind resource areas in Wyoming and Montana that generate renewable power. A number of independent studies estimate the average cost of wind energy produced in these states is less than half the average cost of wind energy produced in California. Stanford University Professor Frank Wolak, in written

RPS Requirements – The Three Buckets

The renewable portfolio standards legislation, SBX1 2 (Simitian), enacted in April 2011, not only set the target of 33 percent renewable energy by 2020, it identified three categories or "buckets" of renewable energy credits.

The first and preferred category or bucket is renewable energy, such as solar or wind power based in California, that is directly connected to a California balancing authority or connected to a balancing authority that provides power to a California balancing authority and can be delivered in real time or scheduled on an hourly basis. This renewable energy also is referred to as bundled energy because the energy and the credit are bundled together.

The second category is renewable energy that is not directly connected to a California balancing authority or delivered in real time, yet provides actual electricity to the state. This energy is frequently referred to as firmed and shaped energy. Firming is a process that uses back-up generation to ensure the reliability of an intermittent energy resource and shaping is when uneven production is filled in to create a consistent block of power.

The third category is electricity that is not directly connected to a California balancing authority, and is referred to as an unbundled renewable energy credit – the credit is sold as a commodity separate from the actual energy. These credits can be purchased by utilities and can count toward a portion of the total renewable goal. Utilities can buy these credits from out-of-state wind farms, and the electricity does not have to be used in California.

SBX1 2 established minimum quantities for the first category, the bundled energy, and maximum quantities for the third category, the unbundled energy, to be achieved during three time periods. Firmed and shaped energy can be used toward the remainder of a utility's renewable target. The chart below depicts the time periods and the minimum and maximum requirements from each bucket:

Time Period	Bundled	Unbundled REC	Firmed & Shaped
2011-2013	At least 50%	Up to 25%	The remainder
2014-2016	At least 65%	Up to 15%	The remainder
2017-2020	At least 75%	Up to 10%	The remainder

Sources: SBX1 2 (Simitian) Bill Analysis. Senate Energy, Utilities and Communications Committee. February 15, 2011. Also, California Public Utilities Commission. February 3, 2012. "Renewables Portfolio Standard Quarterly Report, 4th Quarter 2011." Also, Division of Ratepayer Advocates. January 31, 2012. "The Renewable Jungle: A Guide to California's Renewable Policies and Programs." Page 12.

testimony to the Commission, wrote that "a focus on California-only renewable resources to meet the state's RPS goals, is contrary to the approach California has traditionally taken to meeting its electricity needs…California has historically relied on imports to meet roughly one-quarter of its energy needs. These inexpensive imports of electricity have helped fuel California's economic growth over the past 40 years."[73]

Commission staff was told that the renewable categories included in the legislation were the product of a compromise with labor advocates and others who saw the expansion of in-state renewable energy plants as an opportunity to create green jobs in California, a key consideration in 2011 given California's prolonged high unemployment rates. At a California Energy Commission workshop on jobs and renewable energy, one senior official from the California Environmental Protection Agency invited to present at the event suggested that higher future energy costs created by the adding a large quantity of higher-cost renewables to California's energy mix could dissuade energy-intensive companies from outside the energy sector from locating or expanding operations in California. This could offset any short-term job gains in constructing and installing new renewable energy plants.

The senior official also said that expanding renewable energy in California likely will result in a small negative net impact on jobs. Job growth will occur in areas where new solar or wind plants are installed but will decrease in areas where electricity rates increase. According to the senior official, "as long as renewable energy is more expensive than gas generation, the net jobs impact is likely to be negative."[74] The overall impact on the California economy, however, is projected to be very small and mostly is expected to result in a shuffling of jobs from one industry to another.[75]

At a Commission subcommittee meeting in January 2012, CAISO officials said the market over time likely would have naturally developed in a way that reflects the three required categories set out in the legislation. The statutorily imposed timeline and category requirements create an artificial and therefore potentially more expensive generating environment, they said.

The Commission has concluded that, going forward, renewable energy policy should encourage greater integration of renewable energy from across the West in North America, not only to reduce costs, but to bolster reliability and protect the environment. Geographic supply diversity reduces the variability of renewable energy. Increased integration across the West could smooth out the intermittency issues inherent with solar and wind technologies and potentially reduce the need for additional fossil fuel plants.[76]

A Call for Rate Reform

There is general agreement that utility customer rates will rise as a result of implementing the Renewable Portfolio Standard. Less well-understood is the significant risk that the burden of these rate increases will fall more heavily on some than on others. In response to the 2000-01 energy crisis, policy-makers expanded the number of rate tiers charged by the investor-owned utilities and placed a rate cap on the two lowest tiers. The tiers are designed to promote conservation – rates rise with each tier increase. The rates also are calibrated to climate zones. Even with calibration, electricity customers in temperate coastal areas are typically able to stay in the lower rate tiers, while for Central Valley electricity consumers, a protracted heat wave can result in significant spikes in electricity bills for those residents trying to keep cool. During the past decade, all rate increases have been directed at the higher tiers, resulting in top tier rates that are nearly three times as costly as the lowest tier, where rates do not cover the cost of generation. Low-income electricity customers and those with certain medical conditions have protections that limit electricity costs. Those who do not fall under those protections and who use more electricity than others effectively subsidize those who consume less.[77]

Legislation enacted in 2009 eliminated the rate cap and authorized a gradual increase in rates in the lowest tiers. These increases would be offset by rate reductions in the higher tiers.[78] As the more costly renewables come online in 2015 and 2016, however, the bulk of the rate increases still will go to the upper rate tiers. Eventually, the cap on the lower rate tiers will be eliminated, at the end of this decade or early in the 2020s with the retirement of the revenue bonds issued to fund emergency electricity contracts during the energy crisis.

The expansion of distributed generation – typically rooftop solar – also feeds ratepayer inequities. Current law allows electricity customers who also generate electricity to sell that power back to the investor-owned utilities. As a result, these customers reduce their exposure to costs associated with upkeep of the distribution system – the wires and the poles. They also reduce their exposure to fees for public purpose programs that are funded through electricity rates, energy efficiency programs and programs that provide assistance for low-income electricity customers.

How California Sets Rates for Customers of Investor-Owned Utilities

California law dictates electricity rates for customers of the investor-owned utilities. The rate structure is divided into tiers with a baseline set as the energy allowance for basic needs, such as heating, lighting and cooking. Baseline electricity, or "Tier 1," is billed at the lowest rate and is determined by the average amount of energy consumed by households in the same climate zone, which are based on altitude and temperatures. Typically, the amount of kilowatt hours allowed for the baseline is higher for Central Valley and desert communities, which experience high summer heat and for mountain regions, which experience colder winter weather than more temperate coastal communities.

The California Public Utilities Commission sets the rates every three years, although utilities can and do request rate changes in response to changing market conditions within the three-year period. Each investor-owned utility has multiple rate tiers and each tier has a higher cost to promote conservation, so the greater the electricity use, the higher the bill. There also are lower rate categories for low-income households, through the California Alternative Rates for Energy (CARE) program and for customers with certain medical conditions.

The rates within each tier are the same; however, the amount of electricity use that moves a customer from one rate tier to another is different depending on the climate zone. People in hotter climate zones have higher baselines than those in cooler climates and can use more electricity before they move into a higher rate tier. The example below depicts the summer rates per kilowatt hour for Pacific Gas and Electric customers in San Francisco and Merced and the total kilowatt-hours within each of the five rate tiers.

	Tier 1/Baseline	***Tier 2***	***Tier 3***	***Tier 4***	***Tier 5***
	Up to Baseline	101-130%	131-200%	201-300%	>300%
Rate per kWh	.13 cent per kWh	.15 per kWh	.30 per kWh	.34 per kWh	.34 per kWh
San Francisco	0-225 kWh	226-293 kWh	294-450 kWh	451-675 kWh	676+ kWh
Merced	0-513 kWh	514-667 kWh	668-1026 kWh	1027-1539 kWh	1540+ kWh

A PG&E customer in Merced in the summer could use more than twice as much electricity as a customer in San Francisco before moving from the baseline rate to the Tier 2 rate. By setting the baseline by climate zone, customers living in hotter and colder parts of the state are insulated, to some degree, from overly expensive electricity bills, although their overall higher electricity usage will cause their bills to be higher than their coastal counterparts and significantly higher if there is a prolonged heat wave.

A rate freeze enacted by the Legislature during the energy crisis in 2001 (AB X1) to protect California from the skyrocketing electricity prices remained unchanged, until recently, preventing the CPUC from increasing rates in Tier 1 and Tier 2. As costs of electricity generation have increased over the past decade, the higher rate tiers have had greater increases, at least doubling and in some cases more than tripling. An unintended consequence of the rate freeze on the lower tiers is that customers who reach the higher rate tiers increasingly are subsidizing those in the lower tiers. As the higher priced renewables come online and are factored into the rates, the higher tiers will increase even more, making the cross-subsidy even greater.

At the same time, the state has promoted distributed electricity generation, typically rooftop solar, and current law allows residents to sell electricity back to the investor-owned utilities thereby reducing or avoiding costs associated with upkeep of the distribution system. As a result, those who can afford solar panel installations are increasingly being subsidized by those who either cannot afford solar, renters and those whose homes are not optimal for solar generation.

Sources: California Public Utilities Commission. July 2010. "How Your Electricity Bill is Calculated." Also, California Public Utilities Commission. "Baseline." http://www.cpuc.ca.gov/PUC/energy/Electric+Rates/Baseline/baselineintro.htm. Website accessed October 19, 2012. Also, Pacific Gas & Electric. "Understand Your Electric Charges." http://www.pge.com/myhome/myaccount/charges/. Website accessed October 19, 2012. Also, AB 1X (Keeley) Approved by Governor Davis on February 1, 2001.

As more solar panels are installed locally, a smaller number of customers will pay a growing proportion of the system maintenance and public purpose program fees. Effectively, those who can afford to invest in solar are increasingly being subsidized by those who either cannot afford solar, renters and those whose locations are not optimal for solar generation.

San Diego Gas and Electric, in late 2011, attempted to get the CPUC to approve a "network usage charge," a fee that would enable the utility to collect more from customers with solar to apply to costs for system maintenance and the public purpose programs. The proposal met with significant resistance from the solar industry and from customers with rooftop solar.

Solar proponents asserted allowing the fee would change the economics of rooftop solar and chill a booming industry that supports the state's policy goals. Critics also viewed the proposal as an attempt by the utility to reduce or eliminate competition from solar providers. In January 2012, the CPUC ruled that the proposal was inconsistent with current law.[79]

Ultimately the state is going to have to find a way to balance its goals for expanding distributed generation without excessively burdening those who do not have access to solar.

Efforts to Assess the Costs and Benefits of Energy Policy

Several attempts have been made to quantify the impact of implementing the Renewable Portfolio Standard on electricity rates, though no current studies exist that reflect new policies, changing electricity market factors, or how new technology changes cost considerations.

California Public Utilities Commission staff, working with contracted consultants, in 2009 attempted to assess the potential costs of various scenarios in implementing the 33 percent by 2020 Renewable Portfolio Standard, before the 2011 RPS was enacted. In a June 2009 report, the authors estimated that average statewide electricity costs per kilowatt hour would rise by 16.7 percent by 2020 from 2008 levels without additional investments in renewable energy. According to the study, this increase reflected the need to maintain and replace aging transmission and distribution infrastructure, anticipated investments in advanced metering infrastructure and other smart grid capabilities, the cost of repowering or replacing generators to comply with once-through cooling regulations and the cost of procuring new conventional generating resources to meet increased electricity demand. The study

projected that total statewide electricity expenditures would be 10.2 percent higher if the state pursued the goal of 33 percent renewables by 2020 than if no new renewables were added and utilities continued to make investments to meet growing demand mostly with natural gas.[80]

Many factors have changed since the 2009 study was published. Policy-makers enacted the 33 percent by 2020 Renewable Portfolio Standard in 2011, and the law included unforeseen rules, such as the previously described "bucket" categories of renewables. The California Air Resources Board also completed its rulemaking and the rollout of its cap-and-trade regulations as part of its implementation of AB 32. Technology advances and market forces over the past two years have reduced prices, particularly the price of photovoltaic panels used in solar plants.

Another attempt to assess costs and benefits of implementing a Renewable Portfolio Standard was done by the California Air Resources Board as part of a 2010 rulemaking process. In September 2009, through executive order, Governor Arnold Schwarzenegger tasked the California Air Resources Board with developing a regulation for a 33 percent renewable energy target by 2020 as part of its implementation of AB 32. The board assessed the economic impacts of the 33 percent goal and used an updated version of the CPUC economic model to assess the costs of achieving 33 percent versus the 20 percent target. Its analysis included costs associated with existing electricity transmission, distribution and generation, new conventional energy needed to meet increased demand in 2020 and estimates for costs to build new renewable generation and transmission. Costs were estimated for two possible scenarios, a lower energy use scenario that included various energy efficiency programs that reduce demand and a higher load scenario that did not account for these programs.

The study found that the costs of the Renewable Electricity Standard program translated into average monthly utility bill increases in 2020 of between 3 and 10 percent for residential users, depending on overall energy use, and about 6 percent for small businesses. The study acknowledged that a cap-and-trade program for greenhouse gas emissions potentially could affect the cost of implementing the renewable electricity standard. The air board did not assess the effect of a cap-and-trade program, as it had not been developed or implemented at the time the board was doing the study.[81] (The state's first cap-and-trade auction was held in November 2012. The auction attracted three times as many bidders as buyers, and all 23.1 million permits offered to cover projected 2013 emissions were sold, raising $233 million. The CPUC has proposed

that money be directed to small businesses and residential electricity customers to offset expected higher prices for cleaner energy.)[82]

The California Energy Commission conducted research and held workshops as part of its 2012 Integrated Energy Policy Report process. In a draft released in October 2012, the commission noted the need to improve transparency of renewable generation costs. It said that many studies "provide levelized cost of generation evaluations but do not adequately document how key assumptions were derived and how assumptions can lead to widely varying cost estimates."[83] It recommended better coordination to identify cost data already publicly available and to identify what additional information is needed. The report also suggested the Energy Commission develop a framework to prepare estimates of the costs of renewable distributed generation. The draft report also suggested that planners and policy-makers consider differences in the economic value among renewable technologies when analyzing costs and benefits.[84]

Separately, the California Municipal Utilities Association has hired consultants who are assessing the effects of six current and potential policies on costs for the municipally-owned utilities. These six policies include:

- The 33 percent renewable target by 2020
- Implementation of AB 32
- Once-through cooling regulations
- Delta flow criteria
- Governor Brown's goal of 12,000 megawatts of distributed renewable generation
- Reaching a 40 percent renewable target by 2025.

The association expects to publish its results in late 2012. Although this information will provide an important snapshot of the effect of multiple policies on the municipal utilities and their customers, these utilities serve fewer than a quarter of California's utility customers.

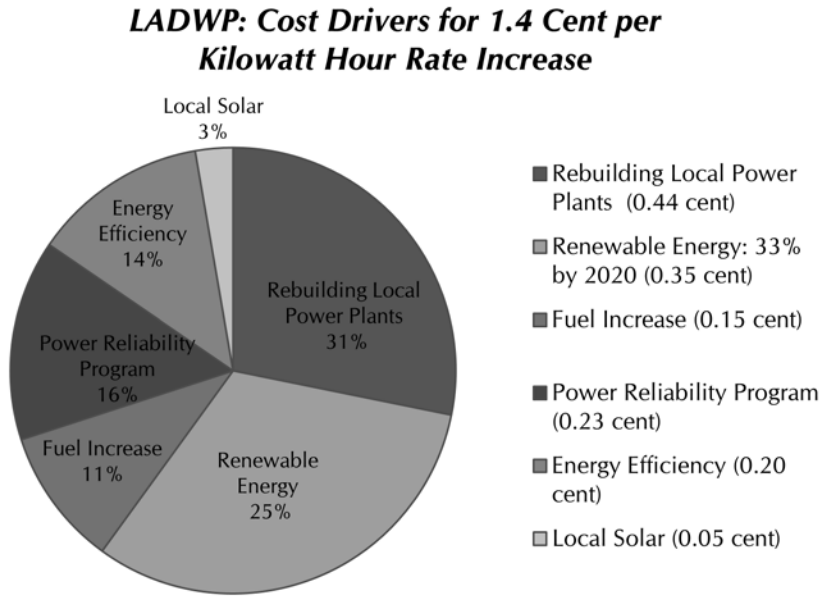
The CPUC, in its May 2012 annual report to the Governor and the Legislature on its actions to limit utility cost and rate increases, promised to "strive to make more cost data available and accessible to the public." Specifically, the CPUC committed itself, within the next 12 months, to initiate a rate forecasting project "to evaluate trends in the various components of the bundled retail rate through 2017, identifying the primary cost drivers among energy programs and activities as well as mechanisms for mitigating such costs."[85] The Commission recommends that this information be made available for consumers on the CPUC's website in an easy-to-understand format. To date, the political will has

been lacking to address these cost issues in an ongoing manner that engages ratepayers.

While the studies are underway, some utilities already have sought rate increases, in part to cover the higher costs of meeting state energy goals. The Los Angeles Department of Water & Power in October 2012 won approval for an 11 percent rate increase over the next two years, in part to cover costs related to compliance with the 33 percent renewable portfolio standard and energy efficiency mandates, but also to replace aging infrastructure. The department expects the average rate for electricity will increase 1.4 cents per kilowatt-hour to 14.1 cents per kilowatt-hour over two years. According to the department, a typical residential customer using 500 kilowatt hours per month would pay $3.65 more per month on an average monthly electric bill of $65.79.[86]

The department provided a cost breakdown of the 1.4 cent increase in a pie chart for its customers. Approximately 73 percent of the cost increase is driven by regulatory mandates, including rebuilding local power plants (to eliminate once-through cooling), expanding renewable energy and complying with energy efficiency and local solar mandates through its customer opportunity program. The department estimates that 16 percent of the cost increase is derived from its power reliability program (replacing its aging transmission and distribution lines), and the remaining 11 percent from projected increases in fuel prices.[87]

By putting a breakdown of the cost increase into an easy-to-understand pie chart, LADWP was able to persuade its board, its newly appointed



Source: Los Angeles Department of Water and Power

ratepayer advocate and a majority of city council members of the need for higher rates. This type of communication increases transparency and helps consumers better understand the electricity system and the costs that are covered by their electricity rates. Utilities should provide readily-available, easy-to-understand charts like this with a breakdown of the costs associated with various mandated programs, including the RPS; once-through cooling upgrades (where appropriate); energy efficiency programs and other state mandates; costs for maintenance and upgrades to the existing fleet; fuel costs; and overhead.

Empowering Consumers with Information, Tools and Options

California lawmakers have enacted aggressive policy goals for renewable energy, and these goals could result in higher electricity bills and electricity service that potentially is less reliable. A July 2012 survey on energy policy indicates that 77 percent of Californians surveyed favor the state's ambitious Renewable Portfolio Standard, although that support falls to 44 percent if it means an increase in electricity bills.[88]

California policy-makers must help make ratepayers aware of the costs of renewable energy. Unfortunately, people think the sun and wind are free and likely will react negatively if, when more renewables come online, their electricity bills go up not down. Renewables ultimately will make California more self-sufficient for energy, but in the short-run they are projected to make electricity more expensive. Despite the upfront costs, the Commission was told that implementing the renewable portfolio standard in the long run will create a "better system for the environment, a better system for society and a better system for the economy."[89]

Smart Consumers Behind Smart Meters

Beyond communicating what to expect, the state also must continue to promote policies that require utilities to empower Californians by giving them the necessary information and tools. So equipped, they will be able to play a greater role in demand response programs. California's energy entities have an established energy resource loading order to guide decision-making. First articulated in the 2003 Energy Action Plan, the load order calls for California's electricity needs to be met in the following order:

1. Increased energy efficiency and demand response.
2. New generation from renewable energy and distributed generation resources.
3. Clean fossil-fueled generation.[90]

The loading order should provide the foundation for decision-making in California energy policy.

Given the emphasis on energy efficiency and demand response, for the state to succeed in implementing the Renewable Portfolio Standard and meet its broader environmental goals, consumers need to be much more informed about their electricity use, much more attuned to what pricing structure exists, and far better able to shift their electricity use in response to those prices.[91]

One promising vehicle for this is the so-called "smart meter." A smart meter is a device that connects an electricity customer to their utility to transmit data. The smart meter records electric usage in increments, typically hourly or every 15 minutes, and transmits the information to the utility via a wireless connection. For the utility, smart meters eliminate the need for meter readers and also alert the utility when there is a power outage. For the customer, the smart meter provides the ability to learn how much energy they are using over the course of the day, week or month. Customers can use this information to make informed choices that can reduce their electricity bills. One example is the "energy alert" that customers can subscribe to so they are notified when they are moving into a higher rate tier, much like a cell phone service provider notifies a customer when they have gone over a data plan limit. By being aware, a customer can consider modifying their use of electricity for the rest of the billing cycle to reduce their bill.

The California Public Utilities Commission has taken steps to require smart meter installations for investor-owned utility customers. Unfortunately, missteps in the initial implementation resulted in back-pedaling on smart meter progress and,, as a result, consumers have the opportunity to opt out of smart meter installation.

Despite the early setback, smart meter deployment is more than 90 percent complete for San Diego Gas and Electric and Pacific Gas and Electric, and approximately 80 percent complete for Southern California Edison, for a total of 17 million smart meters deployed. A very small percentage, approximately 32,000 customers, has opted to forgo smart meters.[92]

California's municipally-owned utilities, which serve the remainder of electricity customers in California, also have begun the move toward smart meter deployment. Most notably, the Sacramento Municipal Utility District (SMUD), the state's second largest municipal electric utility, successfully completed smart meter installation for all of its customers in early 2012, more than 600,000 in all.

Residential Demand Response Pricing Outside California

Many states and the utilities they regulate are embracing the use of smart meter technology. As of May 2012, almost one in three households in the United States had a smart meter. States leading in smart meter deployment by percentage of households are California (86 percent), Texas (67 percent), Pennsylvania (57 percent) and Florida (53 percent).

To date, most smart meter communication goes only in one direction – from the customer to the utility, which uses the data to read meters, detect power outages and track trends. Demand response programs, which allow utility customers to use data from their smart meter to control electricity use and costs, have been implemented only on a limited basis. Of the nation's114 million households on smart meters, only 376,200 are enrolled in dynamic pricing programs.

One of the earliest demand response programs was rolled out by Puget Sound Energy in Washington in May 2001. The intent was to encourage customers to shift their power usage to off-peak periods. Puget Sound Energy ended the program two years later as the differential between peak and off-peak rates was not significant enough to modify behavior. On average, customers who reduced their consumption in peak periods saved less than $2 per month.

Ameren Illinois, a utility serving most of Southern Illinois, implemented a successful time-of-use program in 2007. Peak hour use dropped and customers saved an average of 25 percent on their electric bills. Consumers were more proactive in their choice of when to use electricity. Ameren Illinois provided residential customers Web access to hourly market pricing at the start of the program, giving customers the ability to manage their energy costs by taking simple actions to conserve energy during hours when prices were higher.

Gulf Power Company, serving northwest Florida, also has been successful with time-variant pricing. The 12 year-old program now has almost 10,000 participants and is one of the largest voluntary critical peak pricing programs in the country. Customers have saved an average of 25 percent on their electric bills. The program has a customer satisfaction rate near 90 percent. Importantly, the program has lowered peak demand, reducing the need for additional generating facilities. In December 2011, Gulf Power began installing smart thermostats and digital control units. These devices allow customers to pre-program their heating, air conditioning, pool pumps and appliances, allowing them to shift use to non-peak hours. This new technology has helped 87 percent of the participants lower their electric bills. "Set it and forget it" technologies require little effort by the consumer as the rate monitoring and use adjustment are performed electronically, contributing to a high level of customer satisfaction.

The Canadian province of Ontario also is converting to a time-of-use pricing structure. As of September 30, 2012, approximately 4.4 million of the residential and small business customers in Ontario were on time-of-use billing. The pricing becomes mandatory at the end of 2012 for all consumers in the province that have an eligible time-of-use meter. Residential customers in Ontario typically consume about 36 percent of their electricity during peak hours. If consumers shift their use to off-peak periods, the demands on the system can be greatly reduced.

Sources: Institute for Electric Efficiency. May 2012. "Utility-Scale Smart Meter Deployments, Plans & Proposals. www.edisonfoundation.net/IEE.
Also, Ahmad Faruqui, Ph.D., The Brattle Group. June 28, 2012. "The Transition to Dynamic Pricing." http://www.demandresponsetownmeeting.com/wp-content/uploads/2012/03/6-B-Faruqui-Ahmad-Brattle. Also, Candace Heckman. "Puget Sound Energy Expected to End Variable-rate Plan." November 14, 2002. Time of Use Electricity Billing: How Puget Sound Energy Reduced Peak Power Demands (Case Study) http://energypriorities.com/entries/2006/02/pse_tou_amr_case.php Seattle Post-Intelligencer. Also, Jason Cigarran, Vice President, Marketing, Comverge. 2012. "Why Dynamic Pricing is Smart Pricing." Electric Energy Online. http://www.electricenergyonline.com/?page=show_article&mag=80&article=667. Also, Comverge. "An Intelligent Energy Case Study: Gulf Power. http://www.comverge.com/Comverge/media/pdf/Gulf-Power-Case-Study.pdf . Also, Ontario Energy Board. "Regulated Price Plan FAQs/OEB." http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Electricity%20Prices/Regulated%20Price%20Plan%20FAQs
Also, Ontario Energy Board . September 17, 2007. "Notice of Amendment to a Code/Amendment to the Standard/Supply Service Code/Board File No. EB-2007-0032." http://www.ontarioenergyboard.ca/documents/cases/EB-2007-0032/code-amendments-final_notice_20070717.pdf.

SMUD since has launched the Smart Pricing Options pilot program which provides options for time-of-use and critical peak pricing rates and choices for in-home displays and "smart" thermostats. SMUD anticipates providing customers with additional information and tools through the Web, as well as smart phones and customer service representatives.[93] The four-million customer Los Angeles Department of Water & Power also has begun smart meter deployment. It has embarked on a major smart grid research project in partnership with the University of California, Los Angeles, the University of Southern California and the CalTech/Jet Propulsion Laboratory, three of the largest energy users in Southern California.[94]

A Changing Mosaic: Cars as Storage?

Energy usage patterns are changing in California, from the proliferation of rooftop solar to the rise in popularity of electric vehicles, which can double a household's energy consumption. As more Californians embrace electric vehicles, the state must implement policies that incentivize consumers to charge these vehicles during non-peak electricity usage, when there is spare capacity on the grid. Electric vehicle expansion, for example, could provide a valuable storage tool for wind energy, which peaks at night in California.

Vehicle charging also could be encouraged during the late morning or early afternoon, when electricity from solar plants is strong, but energy use has not yet peaked. Expanding the use of electric vehicles could provide a renewable energy storage solution, improve air quality to enable the state to meet federal Clean Air Act requirements and also reduce reliance on foreign fuel. Dynamic pricing of electricity will be key to achieving these goals.

Stanford's Frank Wolak told the Commission that there is "ample empirical evidence from a variety of dynamic pricing experiments…that customers facing prices that vary with real-time system conditions reduce their hourly consumption by a substantial amount in response to hour price signals. Results from a recent experiment in Washington D.C. … found between 15 percent and 20 percent demand reductions by residential consumers during hours with high retail prices."[95]

One advocate of dynamic pricing is CAISO chairman and City of Long Beach Mayor Bob Foster, though he adds that it must be part of a broader strategy: "Ultimately, this could be a very efficient system and a very effective system, but not without pricing tools, software tools, smart meters and smart consumers behind those meters." He added, "I have a

lot of faith in consumers when it's in their economic interest to perform."[96]

As smart grid technology and software applications become readily available, the California Public Utilities Commission has begun to take the next logical step of examining the current tiered rate structure and opportunities to transition residential customers of the investor-owned utilities to time-of-day and dynamic pricing, which eventually could lead to opportunities for utilities to provide residential customers with fiscal incentives for conserving energy.

Large commercial, industrial and agriculture customers of the investor-owned utilities already have been transitioned to time-of-day electricity rates, which price electricity higher during peak and partial peak energy use periods to encourage customers to reduce electricity demand to off-peak times when electricity costs less. Small and medium businesses are currently transitioning to time-of-day pricing.[97]

In June 2012, the CPUC began the process to "examine current residential electric rate design, including the tier structure in effect for residential customers, the state of time variant and dynamic pricing, potential pathways from tiers to time variant and dynamic pricing, and preferable residential rate design."[98] This assessment, in part, is in response to SB 695 (Kehoe), enacted in 2009, which allows the commission to begin to transition residential customers onto time variant

Goals for Electricity Rate Reform

The California Public Utilities Commission held a workshop in August 2012 and in October 2012 issued an invitation for public comments on a preliminary list of goals for ensuring the rate design and transition to time variant pricing is consistent with legislative and policy goals. The 10 preliminary goals include:

1. Low-income and medical baseline customers should have access to enough electricity to ensure basic needs (such as health and comfort) are met at an affordable cost.
2. Rates should be based on marginal cost.
3. Rates should be based on cost-causation principles.
4. Rates should encourage conservation and energy efficiency.
5. Rates should encourage reduction of both coincident and non-coincident peak demand.
6. Rates should provide stability, simplicity and customer choice.
7. Rates should avoid cross-subsidies, unless the cross-subsidies appropriately support explicit state policy goals.
8. Rates should encourage economically efficient decision-making.
9. Incentives should be explicit and transparent.
10. Transitions to the new rate structure should emphasize customer education and outreach that enhances customer understanding and acceptance of new rates, and minimizes and avoids the potential for rate shock."

The CPUC subsequently will publish a scoping memo with a finalized list of goals and begin the rulemaking proceeding.

Source: California Public Utilities Commission. September 20, 2012. Assigned Commissioner and Administrative Law Judges' Joint Ruling Inviting Comments and Scheduling Prehearing Conference." (Rulemaking 12-06-013).

rates beginning in 2013, with certain limitations and protections for low-income customers. The legislation also was intended to spare ratepayers from unintended spikes when the rate caps implemented as emergency measures during the height of the 2000-01 energy crisis expire near the end of the decade.

Active Agenda, No Plan

Through its laws, the Legislature has set a groundbreaking clean energy agenda.

But an agenda of ambitious goals is different from a plan to implement them.

As the process moves forward to identify and approve sites for new renewable energy plants, and, separately, regulators approve power purchase agreements for new generating capacity, key questions remain unanswered about renewable energy's overall reliability and cost, not the least of which is the installation of transmission to move energy from where it is generated to where it is consumed. Important players can give partial answers from the vantage point of the parts of the system they can see. But California's diffused governance structure means that no single agency has the full picture, or is responsible for the result.

California Lacks a Comprehensive Cohesive Strategy

Absent a cohesive plan, the state's energy agencies have focused on increasing the amount of communication and coordination through an administration-sponsored Renewable Energy Action Team. This effort relies heavily on the persuasiveness and convening power of the team's leader, Michael Picker, and the personal influence of Governor Brown and U.S. Secretary of the Interior Ken Salazar. Its sense of urgency also has been fueled by memories of the 2000-01 blackouts, when the lack of adequate communication and coordination exacerbated the state's energy crisis.

Given the cast of players, coordination and communication is a complex undertaking.

This disjointed process has worked for the purpose of getting approval for enough renewable power generation projects to meet the state's short-term electricity supply targets. Less clear is how the process ensures that the state will have adequate transmission to distribute this new power and at what cost, whether the blend of sources will match demand at critical times of the day, and whether the aggregate cost of providing

new renewable power and adequate fossil-fuel backup has been adequately calculated and telegraphed to consumers.

California's body of energy laws have been enacted on a piecemeal basis, without an integrated strategy, a product both of the state's lack of a cohesive energy plan and the nature of the legislative process. Similarly, regulations to implement these laws have been promulgated in various venues through numerous proceedings.

Governor Brown has signaled an interest in going beyond the 2011 Renewable Portfolio Standard requiring 33 percent renewable energy by 2020. In a letter in conjunction with his signing the 2011 RPS legislation, Governor Brown wrote:

> *"While reaching a 33% renewables portfolio standard will be an important milestone, it is really just a starting point – a floor, not a ceiling. Our state has enormous renewable resource potential. I would like to see us pursue even more far-reaching targets. With the amount of renewable resources coming on-line, and prices dropping, I think 40%, at reasonable cost, is well within our grasp in the near future."*[99]

Witnesses told the Commission that so many layers of new laws, enacted over such a short period of time, may mean the state's energy and environmental departments may not be working in concert and even may be working at cross-purposes. "California energy regulators and stakeholders are buried under a proliferation of policies," Mayor Foster told the Commission.[100]

Written testimony from the California Municipal Utilities Association illustrates some of these concerns. The group supports the 33 percent renewable goal, but cautions that meeting the goal will come with significant additional costs, in part as a result of the cumulative state policies and mandates:

> *"The cost implication from cumulative state policies and mandates is an issue that has not received adequate attention. This has two elements: (1) the overall cost of achieving state goals; and (2) the lack of coordination of overall policy objectives to allow achievement of primary goals at least-costs. For example, if the overarching goal of state energy policy is to reduce greenhouse gas emissions (GHG), various tools to achieve that goal should be compared and balanced. Those tools may include the RPS, demand initiatives, energy efficiency, and other direct environmental regulation on the energy sector. However, today's policy approach results in separate GHG, energy efficiency, and RPS policies, when savings may be realized if these policies were*

> *part of an integrated whole. This results in higher costs for consumers."*[101]

Mayor Foster suggested at a February 2012 public hearing that what California really needs now is a "timeout" on new energy mandates. "We don't need to rush from 33 percent to 40 percent because we don't even know what 33 percent means yet. We need to digest what's there and work on things that will make it a success," he told the Commission. "Let's work on what we have and understand the consequences, get to a reasonable level and not add any new requirements right now."[102]

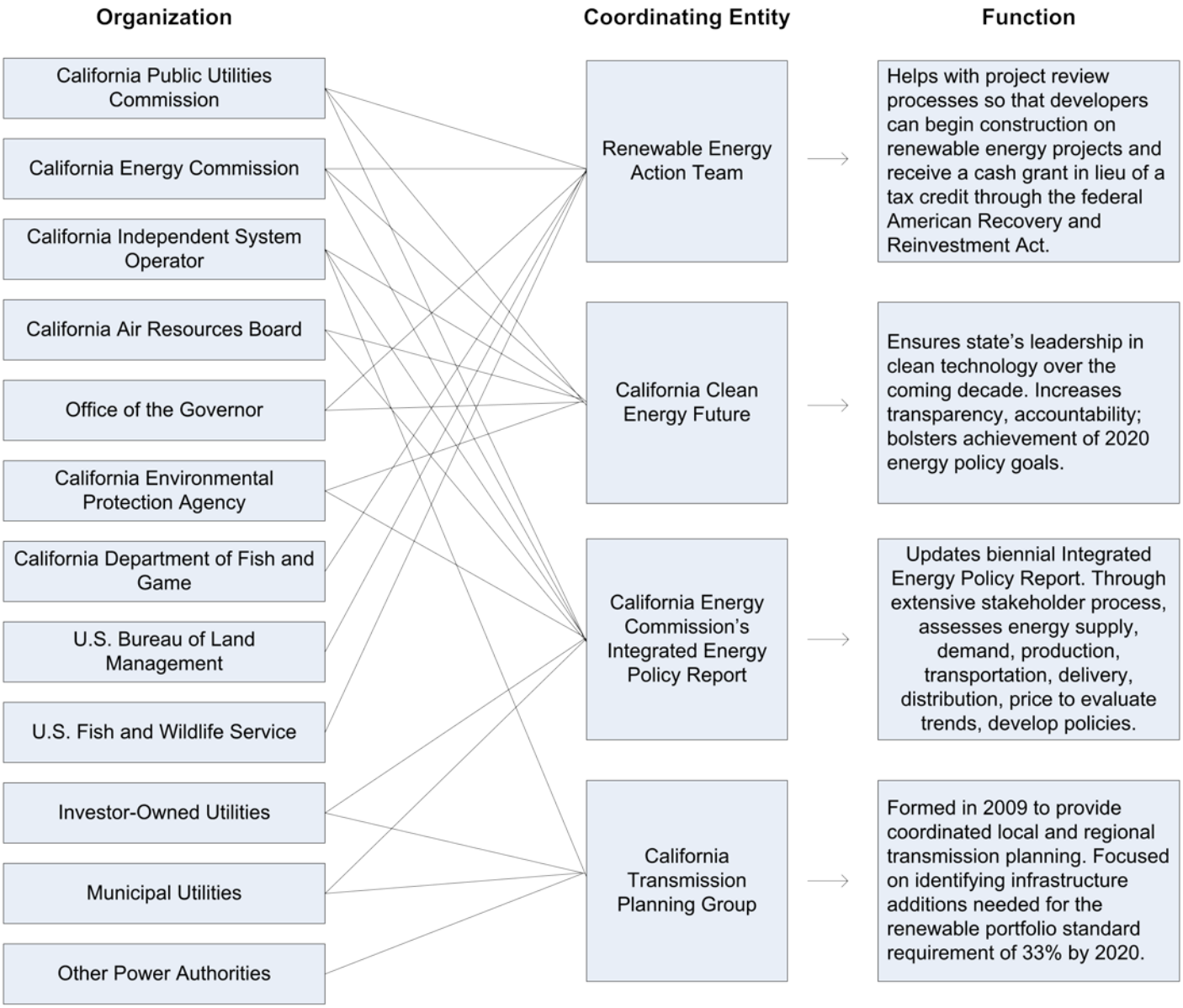
Mayor Foster's call for a timeout on new mandates was echoed by other witnesses who followed at the Commission's February 2012 hearing, including the executive director of the Independent Energy Producers Association, a staff attorney for The Utility Reform Network and the acting director of the Division of Ratepayer Advocates at the California Public Utilities Commission.

"Stop chasing the newest, shiniest object – let's hit 33 percent before we set the bar higher," commented Jan Smutny-Jones, executive director of the Independent Energy Producers Association. Since 2003, California's renewable portfolio standard has undergone a major legislative re-write every two to three years. In his testimony, Mr. Smutny-Jones wrote "Stability in the rules and process is important because as a practical matter, it takes 5-7 years, or longer, to bring online a new generation asset; it takes 7-10 years to develop new transmission. Constantly changing public policies puts projects at risk to investors which comes with an economic impact."[103]

Some of the major activities of the state's energy organizations that are related to or may affect implementation of the Renewable Portfolio Standard, described in greater detail in the previous chapter, include:

- The California Energy Commission's 2012 Integrated Energy Policy Report process, as well as the energy commission's
  - ✓ RPS rulemaking for municipal utilities;
  - ✓ Development of the Desert Renewable Energy Conservation Plan;
- The California Public Utilities Commission's Long-Term Procurement Plan and Resource Adequacy proceedings, and its
  - ✓ RPS rulemaking for investor-owned utilities;
  - ✓ Rulemaking for the RPS cost-containment mechanism;
- The CAISO's annual transmission planning process and local capacity requirements process.

Collaboration Among California Energy Organizations



Additionally, the Air Resources Board is implementing the Global Warming Solutions Act (AB 32). In addition, the air board is leading a statutorily required study to evaluate the electrical system reliability needs of the South Coast Air Basin in Southern California and recommend the most effective and efficient means of meeting those needs while ensuring compliance with state and federal law.

The State Water Resources Control Board has two advisory committees assessing the implementation of the once-through cooling regulations, and also is developing Delta flow criteria, which could affect the state's hydroelectricity capacity.

The weaknesses of California's current approach to energy governance, despite efforts at better coordination and communication, can be seen in the risk of a regional power crisis caused by the unexpected shutdown of the San Onofre nuclear plant.

Although critical players in the state came together and found a solution that avoided brownouts or blackouts in the summer of 2012, some have said that luck also played a role in that the weather was mild, other parts of the system did not unexpectedly fail and the still sluggish economy reduced energy demand.

San Onofre: Surprise Shutdown Generates Uncertainty

An unanticipated shutdown of a nuclear power plant at San Onofre in January 2012 shows how supply risks can escalate quickly because of constraints imposed by a combination of uncertainty, aging infrastructure and regulations issued by multiple agencies with different regulatory goals. Radioactive leaks in steam generation tubes due to premature wear forced the unexpected shutdown. It later was determined that similar, though less severe, wear existed in a second nuclear unit at San Onofre that already had been taken offline for routine maintenance in early 2012. Both units were still offline when this report was published. In October 2012, Southern California Edison indicated that it planned to restart one of the two units at 70 percent capacity. The U.S. Nuclear Regulatory Commission must review the plan, however, in a process that will take months.[104]

The South Bay basin of the Los Angeles metropolitan area features the state's largest population center, an active economy and high electricity demand. The area also is characterized by transmission constraints. The concentration of energy demand in a single geographic area combined with the finite capacity of the transmission grid in the region requires that a large portion of the energy consumed in the region must be produced in the immediate area.

As described previously, the once-through cooling regulations require that the owners of both of the state's nuclear plants, Diablo Canyon and San Onofre, either retrofit or shutter their plants over the next decade. The deadline for San Onofre was set for 2022, the same year that its federal operating license expires. When operating, San Onofre has the capacity to provide enough power for some 1.4 million Southern California households and is a key link in the region's transmission grid.

The response to the unexpected outage exemplifies the improved collaboration and communication between numerous government agencies, which came together quickly to address a situation that could have led to power outages. To make up for some of the lost energy from the prolonged closure of the San Onofre plants, two shuttered Huntington Beach fossil-fuel plants were brought back online, reducing the chance of brownouts or blackouts in the summer of 2012. Utilities also encouraged conservation. A relatively mild summer, the slow economic recovery and energy efficiencies also helped Southern California avoid energy shortages. Southern California also benefitted from the June 2012 completion of the Sunrise Powerlink, a transmission line which took five years of contentious environmental reviews and 18 months to build that now connects San Diego to energy generated in the Imperial Valley.

"The timing for completion of this important new transmission artery could not come at a more critical time," said Steve Berberich, president and chief executive officer of the CAISO. "Sunrise Powerlink is more valuable today than when it was conceived because of the significant reliability benefits it brings helping to compensate for the loss of power from the San Onofre power plant this summer."[105]

Although brownouts were avoided in 2012, the two Huntington Beach plants will not provide power in 2013 or beyond, as the units have been sold to Edison Mission Energy, which will close the units to avoid producing more emissions in the basin when its new Walnut Creek power plant enters service in 2013. Though the new plant is cleaner and more efficient than the plants set to be closed, it will not completely replace the power or voltage of the Huntington Beach plants. Like Southern California Edison, Edison Mission is an operating subsidiary of Edison International.

The location of Edison Mission's new plant was determined in part by air quality issues and requirements set by the regional air quality board, as was the timing of the plant's production ramp-up, so as to minimize added greenhouse gas and other contaminant emissions. The region already fails to meet air quality standards set by the federal Clean Air Act, which potentially puts federal highway money at risk.

The California Independent Systems Operator already has begun developing a mitigation plan for the summer of 2013 with the assumption that none of the San Onofre units will be available. The preliminary plan includes two projects: using the two Huntington Beach plants for voltage support – which will not produce emissions – but not for power and installing shunt capacitors at three Southern California Edison substations.[106]

In filing the request to the Federal Energy Regulatory Commission to move forward with this plan, AES, the owner of the Huntington Beach plants and the CAISO wrote:

> *"Neither project individually is capable of providing the amount of voltage support required in the absence of the SONGS units…No other reasonably feasible option was identified to avoid the unprecedented load shedding that is otherwise at risk here."*[107]

The California Energy Commission in August 2012 began a proceeding with AES, to demolish some of the plants to make way for new, cleaner gas-fired plants which will not use once-through cooling. In the best case scenario, construction of the first of the proposed new plants will begin in 2015.

In the short run, the San Onofre closure leaves the region vulnerable to brownouts during heat waves or if the areas loses additional generating capacity, for example, if a wildfire took out a key transmission line or through an unanticipated outage at another power plant. In a June 2012 workshop, which included members of the CEC, CPUC, the executive director of the CAISO, officials from the Air Resources Board, the South Coast Air Quality Management District, Los Angeles Department of Water and Power and numerous stakeholders, it was evident that the state has not planned for an unexpected long-term outage of both the operating units at San Onofre (a third unit has been permanently decommissioned). Due to the challenges in meeting the localized energy needs of the Los Angeles Basin – transmission siting has been thwarted and state and federal air quality regulations dictate the types of new power plants that can be built within the region – the area will remain at risk of power shortages for the foreseeable future.

Leadership Void

The ability of California consumers to better understand what they can plan to pay for electricity in the coming years is complicated by the number of government organizations that influence that outcome, as well as a confusing array of functions and tasks that ultimately affect the two energy issues they care most about – the dollar amount owed on their utility bill and whether the lights come on when they flick a switch.

As previously described, there are multiple organizations that can influence as well as block decisions that dictate the costs of generation, power plant siting, adequate supply and transmission capacity.

Each of these entities annually engages in an array of public processes which even seasoned industry veterans have difficulty tracking. Some of these processes, such siting or permit approval, can take place simultaneously. Major proceedings in different venues use data about costs and energy usage that may not be comparable across processes, as the data sets and calculations based on them vary depending on the point in time when data were collected. The way the data are collected and presented, moreover, can be influenced by the priorities of the organization, whether the mission is keeping the power flowing, keeping utility customer rates affordable or ensuring compliance with state and federal regulations on energy generation, transmission or pricing.

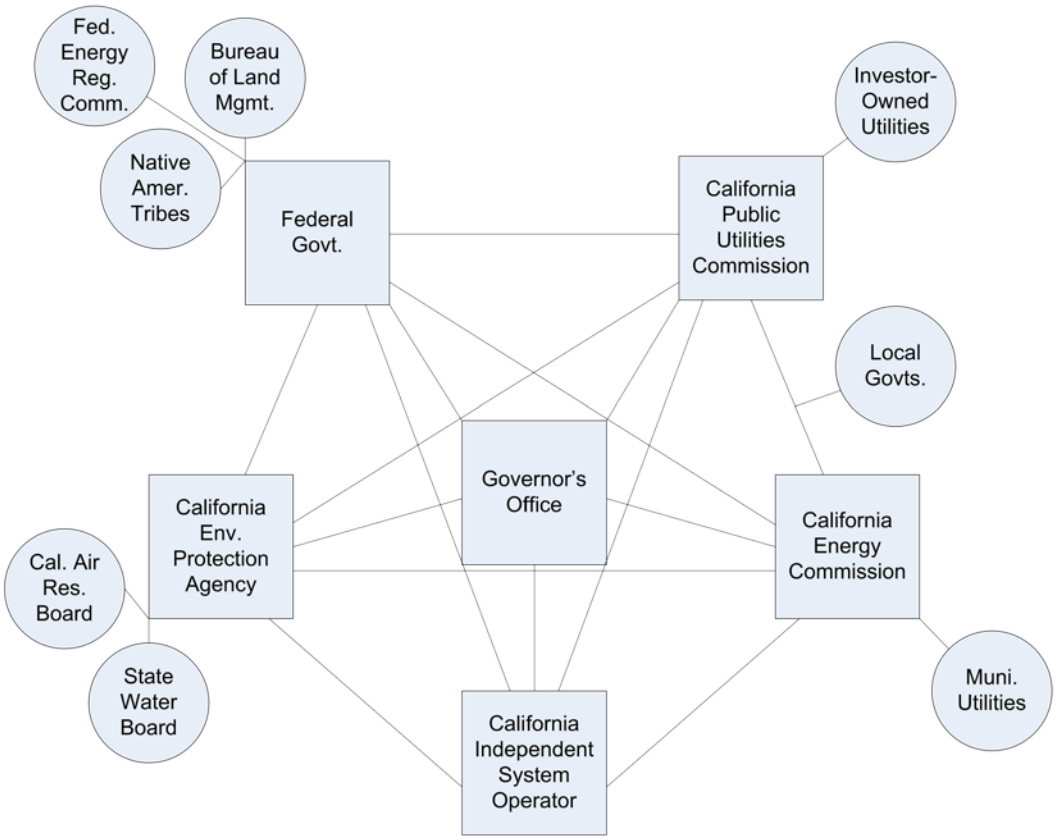
Transmission planning and siting provides an example of this challenge. The California Independent System Operator conducts an annual transmission planning process. Statutory code requires the California Energy Commission to develop a biannual strategic plan for the state's transmission grid. The Energy Commission also is responsible for designating transmission corridors. Federal regulations require a local and regional transmission planning process "that is coordinated among affected entities and that is open to stakeholders." In California, this body is known as the California Transmission Planning Group. For the state's three investor-owned utilities, once a transmission project has been approved by the California Independent System Operator, the utility submits an application for permitting approval to the California Public Utilities Commission.[108]

Carl Zichella, director of Western transmission for the Natural Resources Defense Council, in written testimony told the Commission: "California's transmission system is encumbered by built-in inefficiencies and jurisdictional competition. Correcting this problem could save ratepayers hundreds of millions of dollars in avoided transmission construction costs, reduce needed reserve margins, provide better operational characteristics and reliability, and avoid contentious and destructive environmental siting problems."[109] Mr. Zichella recommended the state establish a Transmission Planning Authority.

The maze of energy functions and authorities ultimately leads back to one person, the Governor. The Governor has appointing authority for all of the members of the California Energy Commission, the California Public Utilities Commission and selects the board members of the California Independent System Operator from a list of candidates developed through a stakeholder process. The Governor also appoints the members of the Air Resources Board and the State Water Resources Control Board. The Legislature also plays a significant role, as it enacts laws that direct the executive branch organizations to implement policies.

Because California has several organizations with overlapping and sometimes competing missions and goals, California lacks the tools and the institutional capacity to develop a comprehensive and coherent implementation plan that provides on-going clarity or a single point of accountability to the public.

Organizations Coordinating on Electricity in California



When the blackouts hit and utility rates soared in 2000 and 2001, Californians ultimately held one person accountable. They did not clamor for change at the energy or public utilities commissions or at the independent system operator. They simply fired their Governor.

Prior Organizational Reform Efforts

This Commission and others have called for governance reforms of California's energy agencies repeatedly in the past. In 2005, Governor Schwarzenegger submitted a reorganization plan for energy governance that would have created a Secretary of Energy and merged some functions of the Public Utilities Commission with the Energy Commission to form a lead entity responsible for coordinating and implementing energy policy. The Commission supported the need for reform, but

rejected the plan because of a legal opinion that found that relocating specific PUC functions was unconstitutional. The Commission asked the administration to resubmit a plan that addressed the state's energy governance weaknesses.

The Little Hoover Commission first supported merging certain CPUC and CEC functions in 1984, and on a split vote in 1995, endorsed a grander but unsuccessful reorganization plan that also would have brought oil and gas drilling regulation under a new Department of Energy and Conservation. The California Performance Review, as well as numerous legislative proposals and reports from the Legislative Analyst's Office, Bureau of State Audits and outside groups, also drew attention but failed to resolve the governance challenges.

The most recent effort to restructure the state's energy organizations, in 2009 by Assemblymember Mike Villines, failed to reach the Governor's desk. ABX3 33 (Villines) would have reconfigured the California Energy Commission into a department with a Secretary of Energy appointed by the Governor and confirmed by the Senate. The secretary would serve as the chair of a four-member energy board. The new department would be required to develop a strategic plan for energy.

The law also would have:

- Transferred authority for certifying transmission projects from the CPUC to the Department of Energy.
- Transferred authority for certifying solar generation projects from local government to the Department of Energy.
- Authorized the Energy Board to designate preferred areas for development of renewable energy.

The 2000-01 energy crisis forced cooperation among California agencies to synchronize energy planning and improve timelines for infrastructure development. Collaborative efforts have continued among an ever larger assortment of agencies as California has pursued its renewable energy targets.

The foundational effort, known as the Energy Action Plan, came in 2003 from the CEC, CPUC and now-defunct Consumer Power Authority. The Energy Action Plan established goals and actions for adequate, reliable and reasonably priced electrical power and natural gas supplies. The agencies updated the plan in 2005.

From the Energy Action Plan in 2003 to the the Clean Energy Future Implementation Plan, released in September 2010, the state energy entities have shown improvement in working to better coordinate

interrelated activities. The Renewable Energy Action Team exemplifies what can be achieved when a senior advisor is given the authority of the Governor and a timeframe to achieve results.

Although the Commission commends the Governor and his senior advisor for the tremendous achievement in implementing the renewable portfolio standard, it has concerns that the progress that has been made streamlining siting and permitting is dependent upon players currently in place. The state still lacks a permanent energy leader to ensure all the players with complementary, sometimes competing missions work together toward state goals.

The Commission saw the consequences of such an approach first-hand in its 2005 review of the California Bay Delta Authority and California's painfully protracted effort to ensure water delivery and restore the Delta. Significant progress was initially made when the state and federal government initiated CALFED, based on cooperation between then-Governor Pete Wilson and then-Secretary of the Interior Bruce Babbitt. When both the state and federal administration changed leadership, CALFED fell apart.

When the Commission was asked by Governor Arnold Schwarzenegger in 2005 to review the governance structure of CALFED, the Commission found that no one level of government was fully in charge, or capable of responding in an orderly and effective way to address and mitigate the range of threats to the Delta. The Commission recommended a leadership structure with the authority to accomplish CALFED's mission with a high-caliber individual in place to lead the initiative.

In conversations with state energy officials and in communications with Governor Brown's administration, the Commission has been cautioned that recommending a system-wide reorganization to improve governance would cause disruption and likely litigation, and delay the state's progress in meeting the goal of 33 percent renewable energy by 2020.

The Commission recognizes both the efforts being made to improve coordination and cooperation among energy agencies, and is sensitive to any reorganization's potential to create disruption and delay. The current approach, however, lacks accountability and clarity. This creates risk and uncertainty for consumers and businesses, which have legitimate concerns about cost and reliability. While this approach has enabled the state to line up enough proposed projects to meet its renewable power targets, it may have complicated efforts to reduce greenhouse gas emissions, boosted aggregate costs and, in the long term, reduced the state's ability to create and attract jobs.

As California makes the transition to renewable energy, its state government must increase both the clarity of the process and accountability for the results in terms of cost and reliability. Both are essential to establishing confidence investors will need and consumers deserve to make this transformation successful.

Ultimately, accountability for ensuring safe, reliable and affordable electricity rests with one individual in California – the Governor. As previously described, Governor Brown and his immediate predecessor Governor Schwarzenegger have succeeded in corralling the energy organizations through a senior advisor given the authority of the Governor's Office to help the state achieve its renewable energy goals. But relying on the ability of one person or even one administration is unworkable given the need to manage a resource that requires long-term planning and government nimbleness in a marketplace where technology changes rapidly and outpaces the state's regulatory abilities. In the long run, organizational reform is essential.

Conclusion

Throughout the Commission's study process, no expert, state official or utility executive has been able to address the cumulative costs and benefits of multiple, potentially competing goals for reducing greenhouse gas emissions, achieving the Renewable Portfolio Standard, implementing once-through cooling regulations and expanding distributed generation.

New and intensified calls for renewable energy will continue, given increasing gasoline prices and the growing concern expressed by many regarding the effects of greenhouse gas emissions on global warming. Those who see a linkage between carbon dioxide emissions and global warming pointed to Hurricane Sandy as a consequence of changes to the earth's atmosphere. It has been used as an example of the growing stakes in the greenhouse gas debate.

No serious discussion concerning this linkage can occur unless all parties are willing to consider the costs associated with achieving greater energy independence and reduced reliance on carbon-based fuels. The state's planning and implementation must consider reliability issues associated with dependence on renewable sources of energy – if anything, Sandy underscored the extent to which our grid is vulnerable to extraordinary natural disaster. Reliability issues – specifically intermittency associated with wind and solar power – require careful management, and potentially significant back up and redundancies in terms of the state's generation capability.

To date, no assessments have been done that will provide answers to utility customers who want to know how implementing the Renewable Portfolio Standard simultaneously with other energy-related policies will influence their electricity bills or help prepare the state for the future. The answer remains elusive, in part, because no one organization is in charge of the state's electricity system.

Ultimately, however, there is one person in charge and that is the Governor. The Governor, in giving authority to a senior advisor to lead the Renewable Energy Action Team, has had tremendous success in siting and permitting new power plants that will help the state achieve its renewable energy goals.

Whether it is through the same or a similar senior advisor and team, or an independently-led task force similar to the Delta Blue Ribbon Task Force, or some other model, the Commission believes the Governor must exert his authority to bring greater clarity and accountability so that Californians will be able to understand and be prepared for anticipated electricity rate increases. The Governor must once again bring together the various organizations that have an impact on electricity rates to come up with answers on how much, in the aggregate, it will cost to implement California's environmental policy goals. The tools for this analysis exist, but the will to get it done has been lacking. This is a complex task, and will require the cooperation of all the state's entities, as well as outside experts.

To instill greater confidence in Californians, the government needs to provide clear and timely information in an understandable format. One clear way to get information across to electricity customers is to put the information in their utility bill and post it in an easy-to-find place on their utilities' website. An easy-to-understand pie chart, similar to the one developed by the Los Angeles Department of Water and Power to explain their 2012 electricity rate increase request, should be used to inform utility customers about the key components that compose their electricity bill – various programs mandated by the state, including the Renewable Portfolio Standard and other policies, maintenance, upgrades and the replacement of existing plants and other electricity infrastructure, overhead costs and fuel costs. The California Energy Commission should develop guidelines and a prototype for displaying this information for the publicly-owned utilities. The California Public Utilities Commission should require the investor-owned utilities to provide this information to their customers.

The California Public Utilities Commission has begun its process to start a comprehensive examination of investor-owned electric utilities' residential rate structures and the transition to time-of-use and dynamic

rates. This assessment will illuminate barriers, and hopefully opportunities to overcome those barriers that are preventing consumers from having both the data and the tools to manage their electricity consumption. This not only will give consumers more control over their electricity costs as they increase, it can expand grid flexibility and avoid incurring the cost and the environmental impact of adding capacity.

The Commission has been told by numerous people that California regulators and stakeholders are buried under a proliferation of new policies. The result may be greater costs and competing policies that ultimately may thwart the state's efforts to achieve its environmental policy goals. The Governor, using the same convening authority that can provide a cost and benefit assessment of implementing the major policies that affect electricity, and with input from the Legislature, should develop an over-arching cohesive strategy for energy in California. This strategy should set priorities and be able to measure progress and calibrate for evolving technologies. Until the state establishes an overarching strategy, the Governor and the Legislature should impose a moratorium on any new mandates that affect electricity.

New and intensified calls for renewable energy will continue, given increasing gasoline prices and the growing concern expressed by many concerning the effects of greenhouse gas emissions on global warming. Those who see a linkage between carbon dioxide emissions and global warming pointed to Hurricane Sandy as a consequence of changes to the earth's atmosphere. It has been used as an example of the growing stakes in the greenhouse gas debate.

No serious discussion concerning this linkage can occur unless all parties are willing to consider the costs associated with achieving greater energy independence and reduced reliance on carbon-based fuels. Nor can we avoid consideration of the reliability issues associated with dependence on renewable sources of energy – if anything, Sandy underscored the extent to which our grid is vulnerable to extraordinary natural disaster. Yet reliability issues – specifically intermittency associated with supply of wind and solar power – requires careful management, and potentially significant back up and redundancies in terms of the state's generation capability.

The Commission began this study with a focus on organizational structure. For more than two decades, this Commission and others have expressed concerns regarding the lack of a clear, identifiable, accountable leader in energy at the state level. The Commission was cautioned by many that now is not the time for reorganization. All of the government players are cooperating and collaborating as never before. This is in part because of the people who are in place. Many of the

leaders in the executive branch have a long history of service together. The Governor and the U.S. Secretary of the Interior are operating from the same playbook on renewable energy. For now, communication is working to bridge structural gaps. But when the leadership changes and the next generation assumes command, the structural weaknesses and organizational dysfunction that so many have seen over the years could reemerge to hobble the state's best intentions. The organizational structure of the state's electricity system is too important to depend upon individuals and personal chemistries. The state's leaders must come together now to design a better organizational structure and a timeline for implementing a new structure.

To address the Commission's concerns, the Governor and the Legislature should tap existing resources. Greater clarity and potential for cost savings for consumers is well worth the investment of time and existing money. A portion of the CPUC Utilities Reimbursement Account, for example, which comes from electricity ratepayers, could be allocated for a cost and benefits analysis. The Governor and the Legislature could direct the California Energy Commission to suspend its Integrated Energy Policy Report process for one cycle and reallocate the money for a public process, led by an independent executive, to develop an over-arching strategic energy plan as well as a plan for organizational reform.

Californians generally have been supportive of the ambitious environmental policy goals that their elected officials have enacted over the past several decades. At this critical juncture, the state's leaders must take the actions necessary to maintain confidence that the state is on the right path for both its environment and its economy.

Ultimately, the Governor must take ownership and take the lead on bringing greater clarity on the costs and consequences of the cumulative energy policies being implemented in California. The Governor must give explicit authority, whether to a senior advisor in the Office of the Governor or to another executive branch official, to harness the resources and the data necessary to find answers and make information readily and easily available to the public.

Because so much is at stake, including the lives and livelihoods of Californians, the Little Hoover Commission is committed to continued oversight, holding regularly convened public hearings and meetings in 2013 and beyond until its concerns are addressed.

Recommendation 1: The Governor, through executive order, should direct the California Energy Commission, the California Public Utilities Commission, the California Air Resources Board, the State Water Resources Control Board and other appropriate executive branch organizations to address the following concerns raised by the Little Hoover Commission in a timely manner, as indicated:

- How much in the aggregate will recent major policies related to energy affect electricity reliability and rates, and are these policies achieving California's stated environmental and economic goals? The assessment should identify and quantify trade-offs involved when aspects of one goal conflict with another. The major policies, and their implementing regulations, that should be assessed in the aggregate include:
  - ✓ California Renewable Energy Resources Act of 2011
    - Renewable energy plant development costs
    - Transmission costs
    - Back-up generation costs
  - ✓ Global Warming Solutions Act of 2006
  - ✓ State Water Resources Control Board Once-Through Cooling Regulations
  - ✓ Governor's goal to build 12,000 megawatts of localized electricity generation
  - ✓ The Commission requests that this assessment be completed in six months and updated annually.
  - ✓ Additional major policies, as they are implemented, such as the State Water Resources Control Board's flow criteria required for the Delta ecosystem sustainability, should be added to the annual assessment.
- What portion of consumers' electricity bills can and will be attributed to major repairs, upgrades and new construction of all electricity generating plants and electricity transmission in California?
  - ✓ The California Energy Commission should develop guidelines for all the publicly-owned utilities and the California Public Utilities Commission should require all of the utilities it regulates to provide and include an easy-to-understand chart with their customers' bills and posted on their websites that shows the breakdown of all the costs reflected in the retail price of electricity.
  - ✓ The Commission requests that these charts be completed in six months and updated annually.
- As the California Public Utilities Commission develops rules to transition ratepayers to time-of-use and dynamic pricing, the state should identify additional barriers that need to be overcome so that California consumers can better manage their energy use and take advantage of fiscal incentives to reduce and strategically time energy consumption. This assessment should include a roadmap and deadlines for implementation.

- ✓ The Commission requests that this assessment be completed in six months.

Recommendation 2: The Governor, through a public process, should establish a comprehensive plan to prioritize current and future energy goals. The plan should identify what actions need to be taken and in what order to maximize progress toward the stated goals.

- ❑ The plan should include guidelines to ensure that proposed legislation is consistent with the goals of the plan.
- ❑ Until the state develops a strategic energy plan, the Governor, through use of veto power, or the Legislature, through its policy committees, should enforce a moratorium on new energy-related mandates.
  - ✓ The Commission requests that this strategy be completed in 18 months.

Recommendation 3: The Governor and the Legislature should develop a plan to modernize energy governance. Organizational reform ultimately is essential if the state is to realize its manifold energy and environmental goals and reduce the risk of another profoundly expensive policy failure.

- ❑ The plan should identify what steps are necessary to restructure the state's energy governance, including options that can occur with and without a Constitutional amendment.
- ❑ The process should give careful consideration to the establishment of a Secretary of Energy, reporting to the Governor, and the consolidation of all energy policy under one agency or commission, with the Secretary of Energy serving as agency secretary or commission chair.
  - ✓ The Commission requests that this strategy be completed in 24 months.

The Commission's Study Process

The Commission initiated this study in response to a request by Senator Mark Wyland, who also is a member of the Commission. Senator Wyland, on the day after the California Legislature enacted the Renewable Portfolio Standard, requested the Commission evaluate renewable-energy related siting and permitting agencies. A copy of Senator Wyland's letter is included in Appendix B.

As the Commission embarked on this study, its initial question was whether the state would be able to achieve its goal of 33 percent renewable energy by 2020 with the state's existing governance structure.

California's energy governance structure has been a concern of the Commission for nearly four decades. In 1974, the California Public Utilities Commission asked the Little Hoover Commission to conduct an analysis of its responsibilities, organization and functions and to recommend opportunities to improve its economy and efficiency. In that study, the Commission recognized the critical importance of the need for close coordination between the CPUC and the then-newly created California Energy Commission, foreshadowing work it would conduct a decade later.

In a 1984, the Commission was concerned that the CPUC and the California Energy Commission were not coordinating their activities and certain functions of the two organizations were duplicative. The Commission also found that organization and coordination of energy planning and electric utility regulation was inadequate. The Commission recommended merging certain functions and making the chair of the California Energy Commission a member of the Governor's Cabinet, although it stopped short of recommending a major reorganization.

Prior Commission Studies on Energy Governance

This is the fifth time in four decades that the Commission has reviewed energy governance. This report and the four prior studies are available to download from the Commission's website at lhc.ca.gov.

"A Study of the California Public Utilities Commission" (December 1974)

"A Study of the Organization and Coordination of Electric Energy Planning and Electric Utility Regulation in California" (February 1984)

"A Review of Governor's Reorganization Plan No. 1 of 1995 – Reorganizing State Energy and Related Functions" (January 1995)

"Letter Regarding the Governor's Reorganization Plan to Create a Department of Energy" (June 2005)

In 1995, Governor Pete Wilson submitted a reorganization plan for the Commission's review that would have created a new Department of Energy and Conservation and brought oil and gas drilling regulation under the new department. The Commission, on a split vote, recommended the plan go forward; however, the Legislature rejected the plan.

Most recently, in 2005 Governor Arnold Schwarzenegger submitted a reorganization plan to the Commission that would have created a Department of Energy led by a secretary reporting directly to the Governor. The Commission supported the concept, but could not fully endorse the plan as it included a transfer of some Constitutionally-established regulatory functions from the Public Utilities Commission to the Energy Commission. Such a move could not legally be accomplished through the reorganization process. The Commission noted in its response to Governor Schwarzenegger that "the need for leadership on energy is essential and cannot be ignored."

For this study, the Commission convened three public hearings. Two public hearings focused specifically on the state's governance and organizational structure of its main energy entities, particularly the California Public Utilities Commission, the California Energy Commission and the California Independent System Operator.

At the first public hearing, held in September 2011, the Commission discussed the governance structure with a former chair of the California Energy Commission, who served as the lead spokesperson for the 2005 Governor's Reorganization Plan, and with the executive director of the California Public Utilities Commission. At this hearing, the Commission also discussed governance and got an update on the progress of siting renewable energy plants from Governor Edmund G. Brown Jr.'s senior advisor on renewable energy, Michael Picker. The Commission also heard from a Stanford University economist and former chair of a market advisory group for the California Independent System Operator. Finally, the Commission also heard from a Kern County planner who has helped shepherd numerous renewable energy projects through the approval processes in that county.

The second hearing, in November 2011, allowed the Commission to further discuss governance with a vice president from the California Independent System Operator, the executive director of the Center for Energy Efficiency and Renewable Technologies, representatives from each of the investor-owned utilities and two municipal utility officials. At this hearing, concerns were raised about the cost and reliability of electricity as a result of the state attempting to implement the aggressive

Renewable Portfolio Standard simultaneously with various other recent laws to improve air and water quality.

As a result, the Commission scheduled a third public hearing, held in February 2012, to learn more about the costs of adding renewable energy to meet the 33 percent by 2020 goal and to explore reliability concerns. Witnesses at that hearing included a private sector economist and electricity consultant, a representative from the Natural Resources Defense Council, the executive director of the Independent Energy Producers Association and the mayor of Long Beach and chair of the California Independent System Operator. The Commission also heard from the acting director of the CPUC Division of Ratepayers Advocates and an attorney from The Utility Reform Network. Hearing witnesses are listed in Appendix A.

In addition to the public hearings, the Commission held three public subcommittee meetings. In September 2012, subcommittee members met with officials from the Attorney General's Office to discuss litigation efforts related to the 2001-02 energy crisis and a deputy director from the California Energy Resources Scheduling Division of the Department of Water Resources, who led the effort during the energy crisis to negotiate electricity contracts.

In January 2012, the Commission subcommittee members toured the California Independent System Operator's facilities and met with executive staff to better understand integration of renewable energy resources, particularly the effect of intermittent resources on grid reliability.

In February 2012, the Commission subcommittee met with two members of the California Energy Commission and senior staff to discuss governance and organizational structure, to better understand the role of the California Energy Commission in implementing the Renewable Portfolio Standard and to discuss the Little Hoover Commission's concerns on electricity costs and reliability.

Commission staff and the subcommittee chair also spoke with staff and a member of the California Public Utilities Commission. Commission staff also attended, listened to discussions from or read transcripts and written comments from numerous California Energy Commission workshops, California Public Utilities Commission proceedings, California Independent System Operator public meetings and State Water Resources Control Board public meetings.

Throughout the study process, Commission staff received valuable input through interviews, meetings and discussions with academics,

economists, environmental advocates, energy producers, investor-owned and municipal utilities, and consumer advocates. Though the Commission greatly benefited from the contributions of all who shared their expertise, the findings and recommendations in this report are the Commission's own.

All written testimony submitted electronically for each of the hearings, and this report is available online at the Commission website, www.lhc.ca.gov.

Appendices & Notes

- ✓ ***Public Hearing Witnesses***
- ✓ ***Letter from Senator Mark Wyland***
- ✓ ***Notes***

Appendix A

Public Hearing Witnesses

Public Hearing on Energy Governance
September 27, 2011

Paul Clanon, Executive Director, California Public Utilities Commission

Joseph Desmond, Former Chairman, California Energy Commission; Senior Vice President, Government Affairs and Communications, BrightSource Energy

Lorelei H. Oviatt, Director, Planning and Community Development, Kern County

Michael Picker, Senior Advisor to the Governor for Renewable Energy Facilities, Governor's Office

Frank Wolak, Professor and Director, Program on Energy and Sustainable Development, Stanford University

Public Hearing on Energy Governance
November 15, 2011

Karen Edson, Vice President, Policy and Client Services, California Independent System Operator Corporation

Richard M. Helgeson, General Counsel, Southern California Public Power Authority

Akbar Jazayeri, Vice President, Regulatory Operations, Southern California Edison

Aaron Johnson, Director, Renewable Energy Policy and Strategy, Pacific Gas and Electric Company

Paul Multari, Vice President, Major Projects Organization, Transmission and Distribution Business Unit, Southern California Edison

Arlen Orchard, General Counsel, Sacramento Municipal Utility District

Wayne P. Sakarias, Director, Regulatory Policy and Legislative Analysis, San Diego Gas and Electric Company and Southern California Gas Company

V. John White, Executive Director, Center for Energy Efficiency and Renewable Technologies

Public Hearing on Energy Governance
February 28, 2012

Tanya L. Bodell, Managing Director and Co-Founder, Electricity Consulting Group, FTI Consulting

Joe Como, Acting Director, Division of Ratepayer Advocates, California Public Utilities Commission

Bob Foster, Mayor, City of Long Beach and Chair, California Independent System Operator

Matt Freedman, Staff Attorney, The Utility Reform Network (TURN)

Jan Smutny-Jones, Executive Director, Independent Energy Producers Association

Carl Zichella, Director of Western Transmission, Natural Resources Defense Council

Appendix B
Letter from Senator Mark Wyland

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California State Senate

SENATOR MARK WYLAND

THIRTY-EIGHTH SENATE DISTRICT

COMMITTEES
APPROPRIATIONS
BUSINESS & PROFESSIONS
GOVERNMENTAL ORGANIZATION
INSURANCE
LABOR & INDUSTRIAL RELATIONS

March 30, 2011

Mr. Daniel W. Hancock, Chairman
Little Hoover Commission
925 L Street, Suite 805
Sacramento, CA 95814

RE: Request to evaluate renewable energy related siting and permitting agencies

Chairman Hancock,

For decades the Little Hoover Commission (LHC) has been an independent voice making recommendations for policy changes to promote efficiency, economy and improved service in California's government. Just recently the LHC reported to the Governor and Legislature on opportunities to act on reforms to improve program outcomes, increase value for taxpayer dollars and restore California's confidence in Government. The key areas identified in the *Smart State Management* report issued November 2010- water management, infrastructure planning, bond oversight, education, public safety and health- omitted our energy infrastructure as an area of priority to seek fundamental changes in service delivery.

In 2005, the LHC provided feedback on the Governor's proposed energy reorganization plan. In this analysis, the LHC stated in their June 23, 2005 letter to the Governor and Legislature that "The need for leadership on energy is essential and cannot be ignored." The LHC went on to state support for consolidating the energy-related state programs. Since 2005, the Legislature has considered these plans, but no consensus has ever been reached.

Since 2005, statutory and regulatory mandates have greatly changed the states goals regarding greenhouse gasses and renewable energy. In 2006 the Global Warming Solutions Act of 2006 (AB 32, Chapter 488, Statues of 2006) was enacted to achieve 1990 levels of greenhouse gas emissions by 2020. Additionally the Renewable Portfolio Standard was accelerated in 2006 from 20% by 2017 to 2010 under SB 107 (Chapter 464, Statutes of 2006). Since 2006, regulations have been established to achieve 33% renewable energy of retail sales by 2020 and the Legislature is considering legislation establishing this standard in statute.

Another aspect of the Governor's proposed energy reorganization plan was to streamline the permitting of power plants. In this analysis the LHC wrote "this proposal needs additional planning and analysis to ensure that proposed changes will actually improve decision-making." The permitting process in California in many ways is still broken. Very few of the proposed renewable energy projects located in California have achieved commercial operation. This is in direct conflict with our desire to utilize California's renewable resources and our preference to capture the economic benefits of developing renewable energy within California to meet our policy goals.

This communication is to formally request the LHC evaluate the performance of each of the state agencies with jurisdiction over this process. While some projects have faced barriers given the health of our financial markets, this alone is not the challenge. Permitting delays have negatively impacted the ability to obtain financing, putting many projects at risk. Duplication among permitting agencies creates a complex web that is difficult to navigate. A single agency of accountability does not exist to create regulatory certainty and finality in decision-making.

Some agencies may be performing better than others. The LHC may consider a comparative tool in evaluating the various agencies involved in the permitting process. What are the factors that are more likely to lead to an efficient, cost-effective outcome? How do different agency processes and cultures impact the ability to site projects? How do the siting agencies compare to best practices around the country, around the state, and each other?

In your review, I respectfully suggest the LHC consider the following in formulating its recommendations to the Governor and the Legislature.

- Are these agencies equipped with the resources to perform these functions such as budget and staff expertise?
- Does the agency role need to be modified or further defined to gain clarity in their role?
- Are these agencies structured in the most effective ways to meet their core mission and deliver expected outputs and products in a timely manner?
- How can the state improve coordination across agencies? Are decision-makers aware of the entire process or just their piece?
- Are there statutory barriers that functionally impair siting and permitting?
- Is conservation planning coordinated with meeting renewable energy mandates?
- Is decision-making transparent both internally and externally?
- What are the best practices in California, nationally and internationally and how are these methods translating into success?
- How do these agencies compare with the siting and permitting agencies of other states?
- How do these agencies compare to agencies that are siting and permitting non-energy related projects?

I strongly urge your favorable consideration of my request The LHC has the abilityto evaluate deficiencies in structures,
organization and operations to make recommendations that are critical to move the State's climate change and renewable energy goals forward. To realize the tremendous economic benefits of developing renewable energy within our borders, California must address the barriers to siting and permitting renewable energy.

I am pleased to work with you in an open study process and am available to discuss this request at your earliest ability.

Respectfully,

Mark Wyland

MARK WYLAND
Senator, 38th District

CC: Stuart Drown, Executive Director Little Hoover Commission

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Little Hoover Commission Members

Chairman Daniel W. Hancock *(D-San Ramon)* Appointed to the Commission by Assembly Speaker Cruz Bustamante in July 1997. Reappointed by Assembly Speaker Robert M. Hertzberg in January 2001, by Speaker Fabian Núñez in March 2006 and by Speaker Karen Bass in January 2009. Former president of Shapell Industries of Northern California. Chairman of the Commission since March 2007.

Vice Chairman David A. Schwarz *(R-Beverly Hills)* Appointed to the Commission by Governor Arnold Schwarzenegger in October 2007 and reappointed by Governor Schwarzenegger in December 2010. Partner in the Los Angeles office of Irell & Manella LLP and a member of the firm's litigation workgroup. Former U.S. delegate to the United Nations Human Rights Commission.

Assemblymember Katcho Achadjian (R-San Luis Obispo) Appointed to the Commission by Speaker of the Assembly John Perez in July 2011. Elected in to the 33rd Assembly District, in November 2010. Serves as vice chairman of the Assembly Committee on Banking and Finance.

Virginia Ellis *(D-Sacramento)* Appointed to the Commission by the Senate Rules Committee in January 2011. Former Sacramento bureau chief for the Los Angeles Times.

Jack Flanigan *(R-Granite Bay)* Appointed to the Commission by Governor Edmund G. Brown, Jr. in April 2012. A member of the Flanigan Law Firm. Co-founded California Strategies, a public affairs consulting firm, in 1997.

Assemblymember Alyson Huber *(D-El Dorado Hills)* Appointed to the Commission by Assembly Speaker John Pérez in March 2010. Elected to the 10th Assembly District in 2008 to represent all of Amador County and portions of Sacramento, El Dorado and San Joaquin counties.

Loren Kaye *(R-Sacramento)* Appointed to the Commission by Governor Arnold Schwarzenegger in March 2006 and reappointed by Governor Schwarzenegger in December 2010. President of the California Foundation for Commerce and Education. Former partner at KP Public Affairs. Served in senior policy positions for Governors Pete Wilson and George Deukmejian, including cabinet secretary to the Governor and undersecretary for the California Trade and Commerce Agency.

Tom Quinn *(D-Marina del Rey)* Appointed to the Commission by Governor Edmond G. Brown, Jr. in February 2012. Currently chairman and CEO of City News Services Inc., managing partner of Sierra Investments, president of Americom Broadcasting and chairman of Reno Media Group.

Senator Michael J. Rubio *(D-East Bakersfield)* Appointed to the Commission by the Senate Rules Committee in February 2011. Elected to the 16th Senate District in November 2010.

Jonathan Shapiro *(D-Beverly Hills)* Appointed to the Commission by the Senate Rules Committee in April 2010. Writer and producer for NBC, HBO and Warner Brothers. Former chief of staff to Lt. Governor Cruz Bustamante, counsel for the law firm of O'Melveny & Myers, federal prosecutor for the U.S. Department of Justice Criminal Division in Washington, D.C., and the Central District of California.

Mark Vargas *(D-Los Angeles)* Appointed to the Commission by Speaker of the Assembly John Perez in February 2012. Currently president of Mission Infrastructure. Currently a member of the boards of the California YMCA Youth & Government Model Legislature and Court, Inland Action and Grand Performances.

Senator Mark Wyland *(R-Escondido)* Appointed to the Commission by the Senate Rules Committee in February 2011. Elected to the 38th Senate District in 2006 and re-elected in November 2010.

Full biographies available from the Commission's website at www.lhc.ca.gov.

"Democracy itself is a process of change, and satisfaction and complacency are enemies of good government."

Governor Edmund G. "Pat" Brown,
addressing the inaugural meeting of the Little Hoover Commission,
April 24, 1962, Sacramento, California