

Cogeneration: Clean, Efficient Energy *At Risk*

A CogenWorks Report
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Cogeneration: Clean, Efficient Energy At Risk

Executive Summary

Will cogeneration be preserved and expanded – or abandoned? The answer will depend on decisions that the California Public Utilities Commission is expected to make this fall.

Right now, there are more than 770 cogeneration projects in California, currently supplying 17% of California's electricity – 9000 MW – while reducing greenhouse gas emissions by more than 26 million tons annually. The California Energy Commission determined in its 2005 Integrated Energy Policy Report that up to 2,000 MW of cogenerated electricity could shut down by 2010 if the PUC fails to implement its policy recommendations for preserving and expanding cogeneration.

Preserving existing cogeneration facilities and providing opportunities for new and expanded facilities is critical to the state's greenhouse gas reduction efforts. The Climate Action Team has tasked the PUC with reducing emissions by 35.4 million tons by 2020, and has identified increased cogeneration as one of the strategies needed to achieve these emissions reductions. But if the PUC fails to implement policies that support existing cogeneration, greenhouse gas emissions could actually increase in the near term and fall short of the long-term goals for 2020 by nearly 75%.

The cogeneration policies that the PUC will implement this fall will determine whether California can continue to rely on clean, efficient cogeneration to supply nearly one-fifth of the state's energy. To preserve and expand cogeneration, the PUC's policy and pricing decisions must:

- Require the utilities to continue using at least as much cogenerated electricity as they are using now by reserving a portion of the utilities' procurement specifically for cogeneration.
- Require the utilities to offer long-term standardized contracts of 10 to 30 years to cogenerators with terms and conditions comparable to what the utilities are setting for their own power plants (like Southern California Edison's (SCE) Mountainview and Pacific Gas & Electric Company's (PG&E) Contra Costa 8).
- Set the price for cogenerated power to match the price set for power generated at the utilities' own power plants (like SCE's Mountainview and PG&E's Contra Costa 8).

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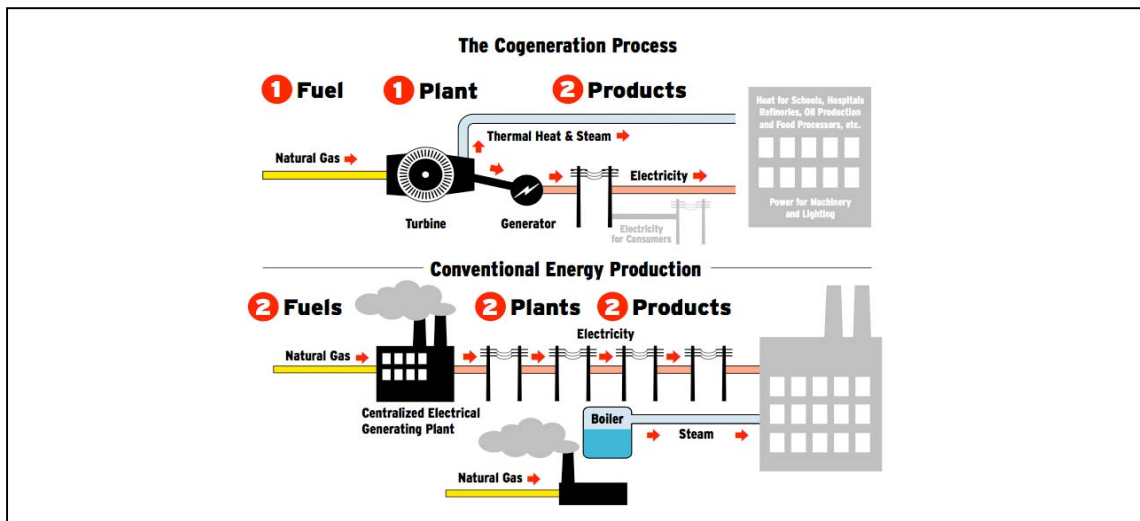
“The Energy Commission recognizes that these [cogeneration] facilities are quite different from traditional merchant plants and that the IOUs [investor-owned utilities] are reluctant to include them in their portfolios. However, the IOUs develop portfolios with a wide range of resources with different operational profiles. Given both the benefits that they offer, the Energy Commission believes it is in the state’s interest to promote these resources. The CA ISO’s recent identification of a need in excess of 25,000 MW for generation located close to load strongly reinforces this conclusion.”¹

California Energy Commission, November 2005

Introduction

Also known as Combined Heat and Power (CHP), cogeneration is a highly efficient technology that uses a single fuel source (usually natural gas) to produce two energy products (usually electricity and steam). It is widely used throughout the world. In California, there are more than 770 active cogeneration projects producing more than 9,000 megawatts (MW) of electricity – that’s 17% of the power generated in the state.² Hospitals, universities, food processors, refineries, and various industries use cogeneration to power their facilities and sell the excess electricity they produce under contract to investor-owned utilities for use by California consumers. The U.S. Environmental Protection Agency (EPA) supports cogeneration as a cost-effective way to achieve both smog and CO₂ emissions reductions,³ and the California EPA has identified cogeneration as a leading candidate for reducing CO₂ emissions and global warming.⁴

Cogeneration is one of the state’s most efficient, local, reliable and environmentally-sound sources of electricity. But at a time when California needs it most, the state is at risk of losing it.⁵ This CogenWorks report explains what California policy makers can do to preserve this important energy resource for the future.



Back to the Future

Prompted by a national energy crisis, the U.S. Congress in 1978 enacted the Public Utilities Regulatory Policy Act (PURPA). The purpose of PURPA was to increase energy conservation and diversify fuel resources by requiring utilities to interconnect with Qualifying Facilities⁶ (QFs) and purchase the excess electricity at their “avoided cost,” which was the price the utilities would have had to pay to generate the electricity themselves.⁷ Following the enactment of PURPA, regulators at the California Public Utilities Commission (CPUC) developed standardized power purchase contracts that set the terms under which QFs sold their excess electricity to utility companies. PURPA was successful; in the years following its enactment it stimulated the development of an independent power market that today provides 17% of California’s energy.

But the cogeneration contracts that industries signed with California’s investor-owned utility companies in the early 1980s are coming up for renewal. Already, contracts between cogenerators and the state’s two largest utilities declined by 73 between 2000 and 2005, resulting in the loss of 251 MW of electricity.⁸ The California Energy Commission (CEC) estimates that as much as 2,000 MW of cogenerated power could be lost between now and 2010 if project owners are unable to renew their contracts with utility companies.⁹

Cogeneration Lost Between 2000 and 2005

	SCE	PG&E	Total	Year
Contracts	170	96	266	2000/01
	106	87	193	2005
Contract Loss	64	9	73	
Megawatts	2406	2686	5092	2000/01
	2257	2584	4841	2005
MW Loss	149	102	251	

Source: SCE Qualifying Facilities Semi Annual Report to the PUC, July 31, 2000 and July 29, 2005; and PG&E Cogeneration and Small Power Production Semi Annual Reports, January 2001 and January 2005.

In its 2003 Integrated Energy Policy Report (IEPR), the CEC highlighted the importance of CHP and Distributed Generation (DG)¹⁰ in meeting the state’s energy needs and called for a distribution system planning process that would address the benefits of CHP and DG. Two years later, though, in its 2005 IEPR, the CEC characterized the increase in CHP as “very small.”¹¹

“Despite policy preferences, DG and CHP in California still struggle with major barriers to market entry in the context of traditional utility cost-of-service grid management. In fact, many of the state’s operating larger-scale CHP systems still run under the terms of generation contracts signed during the early 1980s following the national energy crisis of the late 1970s. These projects could shut down in the near future as their contracts expire. It is estimated as much as 2,000 MW could shut down between now and 2010 because project owners have been unable to renew their utility contracts.”¹²

Cogeneration Projects in California

Type of Business	Number of Projects	Megawatts
Commercial & Public Institutions	515	1717.6
Industrial	161	4407.0
Other (Agriculture, Crude Oil & Quarrying)	100	3005.2
Total	776	9129.8

Source: Assessment of California CHP Market and Policy Options for Increased Penetration, CEC, April 2005.

Clean, Efficient, Reliable and Cost-Effective

Cogeneration helps keep our lights on and our energy bills down. Its tremendous efficiency is literally a breath of fresh air for the environment, reducing greenhouse gas and smog emissions by an amount equivalent to removing more than 5 million cars from California highways every year.¹³ The CEC describes cogeneration as:

“[T]he most efficient and cost-effective form of DG, providing numerous benefits to California including reduced energy costs; more efficient fuel use; fewer environmental impacts; improved reliability and power quality; locations near load centers; support of utility transmission and distribution systems.”

Impact of Cogeneration on Smog-Forming Emissions

Cogeneration Capacity	9,129.8 MW
Annual Reduction in CO ₂ Emissions	26 million tons
Annual Reduction in NO _x	7,607 tons
Equivalent Impact	Eliminating 5 million cars annually

Source for CO₂ and NO_x: Market Assessment of Combined Heat and Power in California, CEC, October 2000. Vehicle emission equivalencies are based on U.S. Climate Technology Cooperation calculators.

In fact, cogeneration is so highly efficient that its use saves 180 billion cubic feet of natural gas per year, enough to provide electricity to 3.6 million homes.¹⁴ A typical cogeneration facility makes use of 68% of the energy resources it consumes, with new systems exceeding 90%. In contrast, separate heat and power systems waste an average of two-thirds of the energy they consume.¹⁵ In the words of the U.S. EPA:

“The average efficiency of fossil-fueled power plants in the U.S. is 33% and has remained virtually unchanged for 40 years. This means that two-thirds of the energy in the fuel is lost – vented as heat – at most plants in the United States. CHP systems achieve effective electrical efficiencies of 50-70%. This improvement in efficiency is an excellent pollution prevention strategy that reduces emissions of air pollutants and carbon dioxide, the leading greenhouse gas associated with climate change.”¹⁶

If California were to expand its use of cogeneration by about 2,000 MW, we could save another 400 trillion Btu of natural gas over the next 15 years (2005-2020) and cut down on greenhouse gas emissions (CO₂) by another 23 million tons.¹⁷ This would be the equivalent of removing another 4.5 million cars from California’s roads.¹⁸ The CEC reports that cogeneration projects could provide 5,000 MW of additional generating capacity over the next 15 years, further increasing the emission reduction benefits.

Average Efficiency of Fossil-Fueled and Cogeneration Plants Compared

	Fossil-Fueled Plants	Cogeneration Plants
EPA’s Efficiency Estimate	33%	50-70%

Source: U.S. EPA and American Council for an Energy-Efficient Economy.

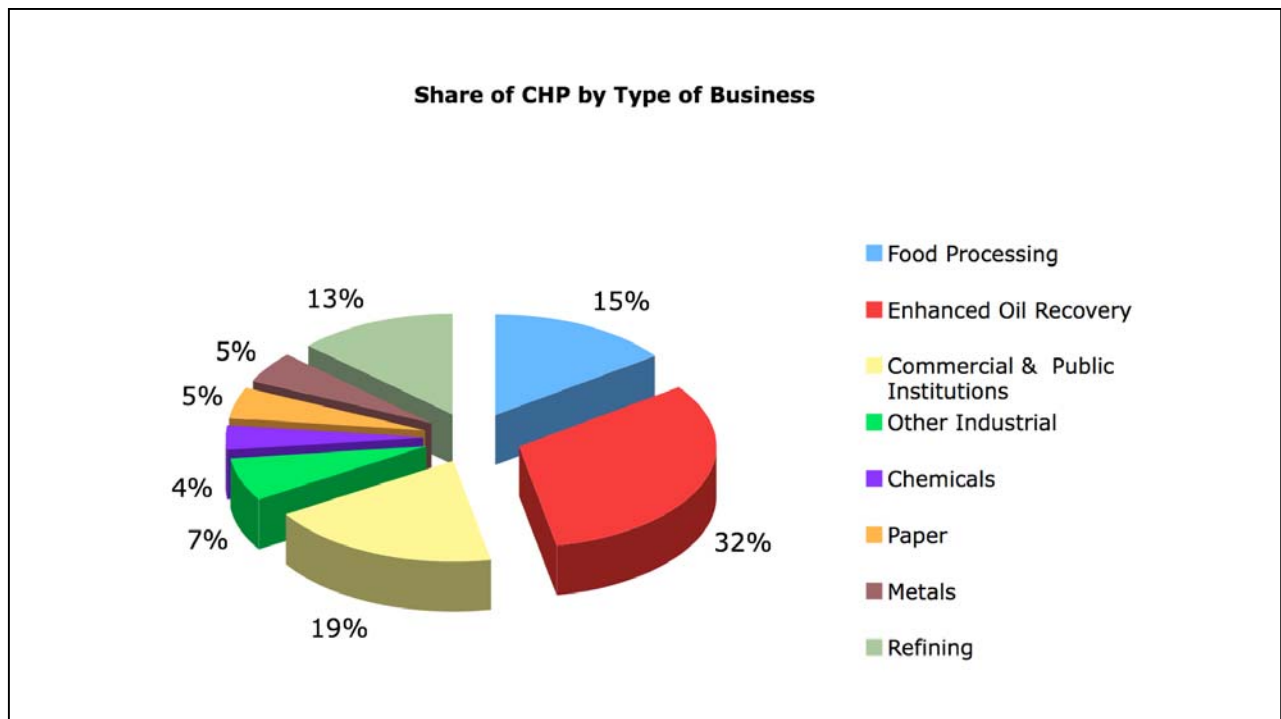
Cogeneration reduces congestion on the state’s energy grid because it relies on private transmission lines, and facilities are located near their end use. Electricity is lost when it’s transmitted and distributed over the power grid. Cogeneration avoids this loss because it’s produced near its end use. By avoiding transmission line losses, cogeneration saves more than 2.7 million megawatt hours per year – enough electricity to power 385,000 homes.¹⁹

Cogeneration is also a way to reduce California’s reliance on out-of-state power supplies and reduce the need to build new fossil-fueled plants, cutting down on both costs and harmful emissions. If contracts between large-scale cogeneration facilities and privately owned utilities are not renewed, California will become even more dependent on power plants that emit large amounts of greenhouse gases and smog-forming pollutants.

Cogeneration is critical to avoiding even higher gasoline prices and more air pollution. The California Energy Commission reports:

“California should particularly encourage CHP at the state’s petroleum refineries to make them less vulnerable to power outages. An electricity outage on September 12, 2005, in Southern California caused the shutdown of three refineries in Wilmington. These shutdowns resulted in pressure buildups that forced refinery operators to flare excess gases, affecting air quality in the area. The shutdown also impacted gasoline production and supply, causing shortages and price spikes. Increased CHP use at refineries is an important strategy that can help insulate refineries from these kinds of electric grid problems and maintain gasoline production and refinery safety.”²⁰

Cogeneration diversifies the state’s energy portfolio, providing a local and reliable source of power in times of need. During the 2000-01 energy crisis, earthquakes, and recent hurricanes, it was cogeneration that helped keep the power flowing, the lights on, and the industrial infrastructures operating while other power supplies failed.



Source: Assessment of California CHP Market and Policy Options for Increased Penetration, CEC, April 2005.

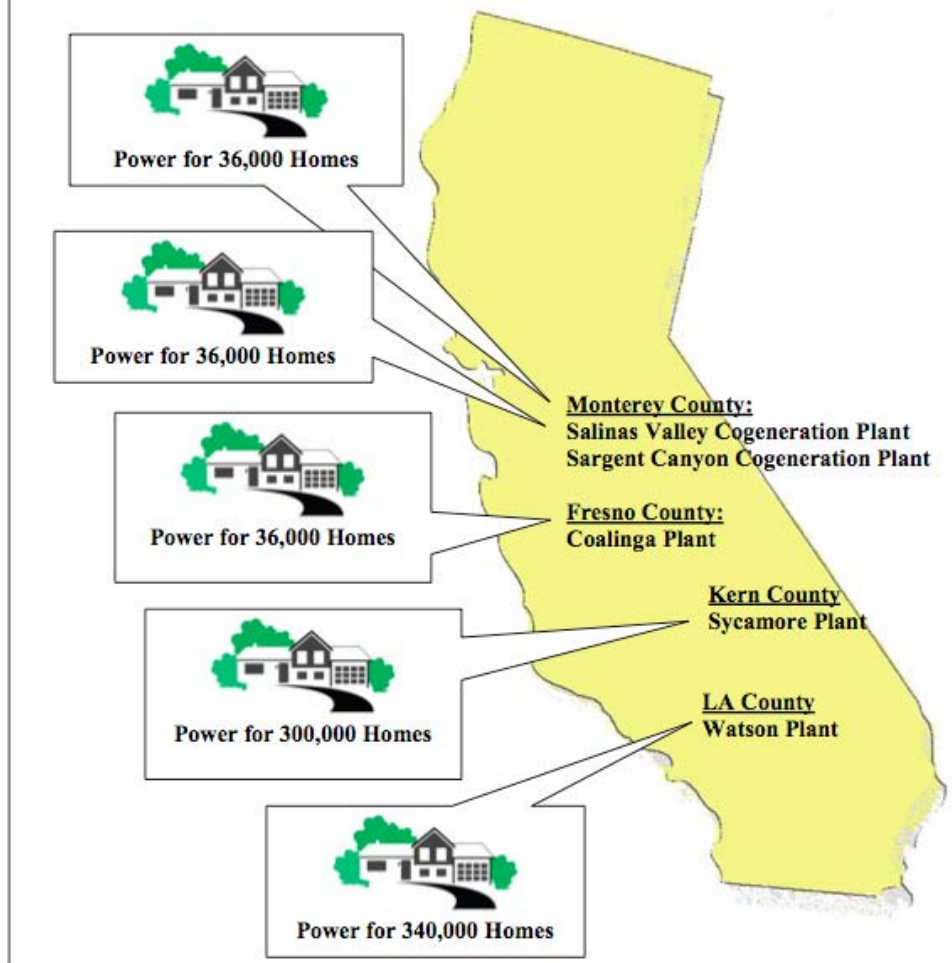
So What's the Problem?

Cogeneration contracts that industries signed with utility companies in the early 1980s are coming up for renewal and California cannot afford to lose one of the state's most promising power sources. As an example, the following five contracts, set to expire in 2007, produce enough electricity to serve approximately 748,000 homes:

- Coalinga, a 36 MW facility located in the Coalinga oil field.
- Salinas River, a 36 MW facility located in the Salinas River oil field in San Ardo, east of Monterey in the Salinas Valley.
- Sargent Canyon, a 36 MW facility located in the Sargent Canyon oil field in San Ardo, east of Monterey in the Salinas Valley.
- Sycamore, a 300 MW facility located in the Kern River oil field in Bakersfield.
- Watson Cogeneration Company, a 340 MW facility located at the BP refinery in Carson, in Southern California.

California's Energy at Risk

These five cogeneration plants currently produce enough electricity to serve approximately 748,000 homes. All five of the power purchase contracts are set to expire in 2007.



A Blueprint for Policy Changes

The CEC has outlined policy changes that must occur for those contracts to be renewed at reasonable rates, such as establishing annual targets for the use of cogeneration in the state's energy portfolio, standardizing an open and fair contracting process, and providing more transparency around utility costs and prices. Now it is up to the CPUC to implement those policies. As part of its comprehensive push for greater energy efficiency and conservation, the CPUC can implement a fair, open, and focused cogeneration policy to preserve this valuable resource. In the words of the Cogeneration Association of California and the Energy Producers and Users Coalition:

“Despite a clear policy preference for cogeneration expressed by the State Legislature, this [California Public Utilities] Commission and the CEC,

cogeneration resources in California are at a crossroads. In order to preserve existing resources and encourage new resources to be built, this [California Public Utilities] Commission must send a clear and unambiguous message to the California business community that its commitment to these resources is real.”²¹

Without CPUC action, the reliability and security of the state’s energy supply and our industrial infrastructures are at risk, and the cost to our environment is considerable. Californians could face even higher energy bills and more power outages, pollution, and greenhouse gas emissions. In addition to retaining the existing cogeneration facilities, the CEC is recommending that the state focus its efforts on promoting the development of large-scale cogeneration projects that could provide more than 5,000 MW of additional generating capacity over the next 15 years.

“Current state policy must change for California to tap into this potential generation source and retain the existing pool of combined heat and power facilities so critical to reliable operation of the state grid. Developers of new combined heat and power facilities are struggling to find customers to purchase their excess power at the wholesale level, and the state’s suspension of direct access hampers their ability to sell their excess power at the retail level. For existing facilities, the unwillingness of utilities to renew existing qualifying facility contracts has led some operators to remove their combined heat and power systems entirely and rely instead on less efficient boilers to meet their heating needs. There will be serious adverse consequences for electric reliability, natural gas demand, and air quality if this trend is allowed to continue.”²²

The California Environmental Protection Agency’s Climate Action Team is also recommending that further development of CHP be encouraged to help reduce overall Greenhouse Gas Emissions. Its December 2005 draft report includes a strategy for encouraging the installation of on-site power production facilities to meet both heat and electricity loads.²³

CogenWorks Supports the CEC’s Recommendations

CogenWorks urges the CPUC to adopt the cogeneration policy changes recommended by the CEC.²⁴ Those recommendations include establishing annual utility procurement targets for cogeneration facilities by the end of 2006, requiring investor-owned utilities to purchase electricity from CHP facilities at prevailing wholesale prices, and standardizing an open and fair contracting process for cogenerators to sell excess electricity to utility companies.

Annual Procurement Targets

Establishing annual procurement targets for cogeneration will take the state’s statements of support for cogeneration out of the realm of rhetoric and translate them into actual policy. Noting that aggressive deployment of additional cogeneration facilities could potentially reduce CO₂ emissions by as much as 112 million tons over the next 15 years (the equivalent of removing 22 million vehicles from our roads),²⁵ the CEC specifically recommended that annual utility procurement targets for CHP be established by the end of 2006.²⁶ In the CEC’s own words, “These are compelling figures and support significant additional emphasis on CHP resources as an important part of California’s energy future.”²⁷

Fair Price

To implement the CEC's recommendation that utilities purchase electricity from CHP facilities at prevailing wholesale prices, the CPUC needs to bring greater transparency to the issue of utility costs and prices. This will ensure that what utilities pay for cogenerated electricity is the utilities' real avoided cost.

Greater Transparency

The need for greater transparency was addressed in some detail in the CEC report. Noting that disputes over access to utility data consumed significant staff resources during the preparation of the IEPR report, the CEC's transmittal report to the CPUC states:

“ The Energy Commission believes that public disclosure of demand forecasts and resource plans, in both energy and capacity terms, is critical to a sound, transparent planning process that is fundamentally responsive to the public it serves. Even greater disclosure is warranted for California IOUs because of their dominant size and the regulatory protection they enjoy as regulated monopolies. A more open environment is also consistent with the Public Records Act, which is designed to ensure the accountability of government to the public it serves. It is broadly worded in favor of open access, and its exceptions are very narrowly defined.”²⁸

Along with greater transparency, standardizing an open and fair contracting process for cogenerators to sell excess electricity to utility companies will set the conditions for fair negotiations for cogenerated power, and ensure a fair deal for ratepayers as well.

Although no regulatory barriers prevent utilities from entering into long-term contracts with cogenerators and other independent power producers, the CEC report noted that many parties who contributed to the IEPR testified regarding the need for standardized contracts, and that the IOUs' reliance on aging and inefficient power plants was perpetuated by their preference for medium and short-term contracts.²⁹ In the words of the CEC:

“Looking ahead to the future development of more workable CHP policies, California must recognize that CHP owners are not in the business of producing or selling electricity. CHP owners will choose to operate their businesses and simultaneously produce electricity only when the economics are favorable to them. ***CHP policy therefore must be different from the policies developed for traditional customer generators and merchant power plants.***” (Emphasis added.)³⁰

The PUC's Role

The cogeneration policies that the PUC will implement this fall will determine whether California can continue to rely on clean, efficient cogeneration to supply nearly one-fifth of the state's energy. To preserve and expand cogeneration, the PUC's policy and pricing decisions must:

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Take Action

Last year the CEC identified the policy changes that must be implemented to encourage cogeneration. Now, the CPUC has an opportunity to implement those changes. In proceedings now underway, the CPUC will soon be deciding how much, if any, of California's electricity should come from cogeneration and how the price that utility companies pay for cogenerated electricity should be set. Decisions on both of these issues are anticipated by mid-June.

CogenWorks is asking California consumers and businesses to help ensure that the CPUC implements the CEC's recommendation. You can help by:

- Writing a letter to the CPUC urging commissioners to keep cogeneration in the state's energy mix. Without CPUC action, we could face higher energy bills, more outages and negative environmental impacts. Visit the CogenWorks web site (<http://www.cogenworks.com>) to email a letter.
- Writing a letter to the editor of your local newspaper to help raise awareness of the threat to our electricity supply.
- Lending your business or organization's name to the coalition effort. Call CogenWorks toll-free at (877) 996-2678 to add your business or organization to the growing list of coalition members.

End Notes

- ¹ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, p. 10.
- ² 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, pp. 74-75.
- ³ U.S. EPA website: http://www.epa.gov/chp/what_is_chp/why_epa_supports_chp.htm.
- ⁴ California EPA, Climate Action Team Report to the Governor and Legislature, December 8, 2005, p. 60.
- ⁵ 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, p. 75.
- ⁶ A cogenerator or other small power producer, which under federal law has the right to sell its excess power output to the public utility, CEC website: <http://www.energy.ca.gov/glossary/index.html>.
- ⁷ Guidebook for Combined Heat & Power, Consultant Report, CEC, October 2000, p. 1.
- ⁸ PG&E Cogeneration and Small Power Production Semi-Annual Reports, January 2001 and January 2005; and SCE Qualifying Facilities Semi Annual Report to the PUC, July 31, 2000 and July 29, 2005.
- ⁹ 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, p. 75.
- ¹⁰ A distributed generation system involves small amounts of generation located on a utility's distribution system for the purpose of meeting local (substation level) peak loads and/or displacing the need to build additional (or upgrade) local distribution lines, CEC website: <http://www.energy.ca.gov/glossary/index.html>.
- ¹¹ 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, p. 75.
- ¹² Ibid.
- ¹³ Vehicle emission equivalencies are based on U.S. Climate Technology Cooperation Gateway calculators website: <http://www.usctcgateway.net/tool/>><http://www.usctcgateway.net/tool/>.
- ¹⁴ Prepared Direct Testimony of R. Thomas Beach on behalf of the California Cogeneration Council, August 31, 2005, CPUC R. 04-04-003 & R. 04-04-025, p. 11.
- ¹⁵ U.S. EPA website: http://www.epa.gov/chp/what_is_chp/why_epa_supports_chp.htm.
- ¹⁶ Ibid.
- ¹⁷ Assessment of California CHP Market and Policy Options for Increased Penetration, CEC, April 2005, p. ix.
- ¹⁸ Vehicle emission equivalencies are based on U.S. Climate Technology Cooperation Gateway calculators website: <http://www.usctcgateway.net/tool/>><http://www.usctcgateway.net/tool/>.
- ¹⁹ Market Assessment of Combined Heat and Power in California, CEC, October 2000, p. 2-25, and rule of thumb MWh to household use calculation (7,000MWh = 1,000 households).
- ²⁰ 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, pp. 74-75.
- ²¹ Opening Brief of the Cogeneration Association of California and the Energy Producers and Users Coalition, March 3, 2006, CPUC R. 04-04-003 & R. 04-04-025, p. 6.
- ²² 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, p. E-4.
- ²³ California EPA, Climate Action Team Report to the Governor and Legislature, December 8, 2005, p. 60.
- ²⁴ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, pp. 12-27.
- ²⁵ Vehicle emission equivalencies are based on U.S. Climate Technology Cooperation Gateway calculators website: <http://www.usctcgateway.net/tool/>><http://www.usctcgateway.net/tool/>.
- ²⁶ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, p. 19.
- ²⁷ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, p. 17.
- ²⁸ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, p. 10.
- ²⁹ Transmittal of 2005 Energy Report Range of Need and Policy Recommendations to the California Public Utilities Commission, CEC, November 2005, p. 15.
- ³⁰ 2005 Integrated Energy Policy Report, California Energy Commission (CEC), November 2005, pp. 76-77