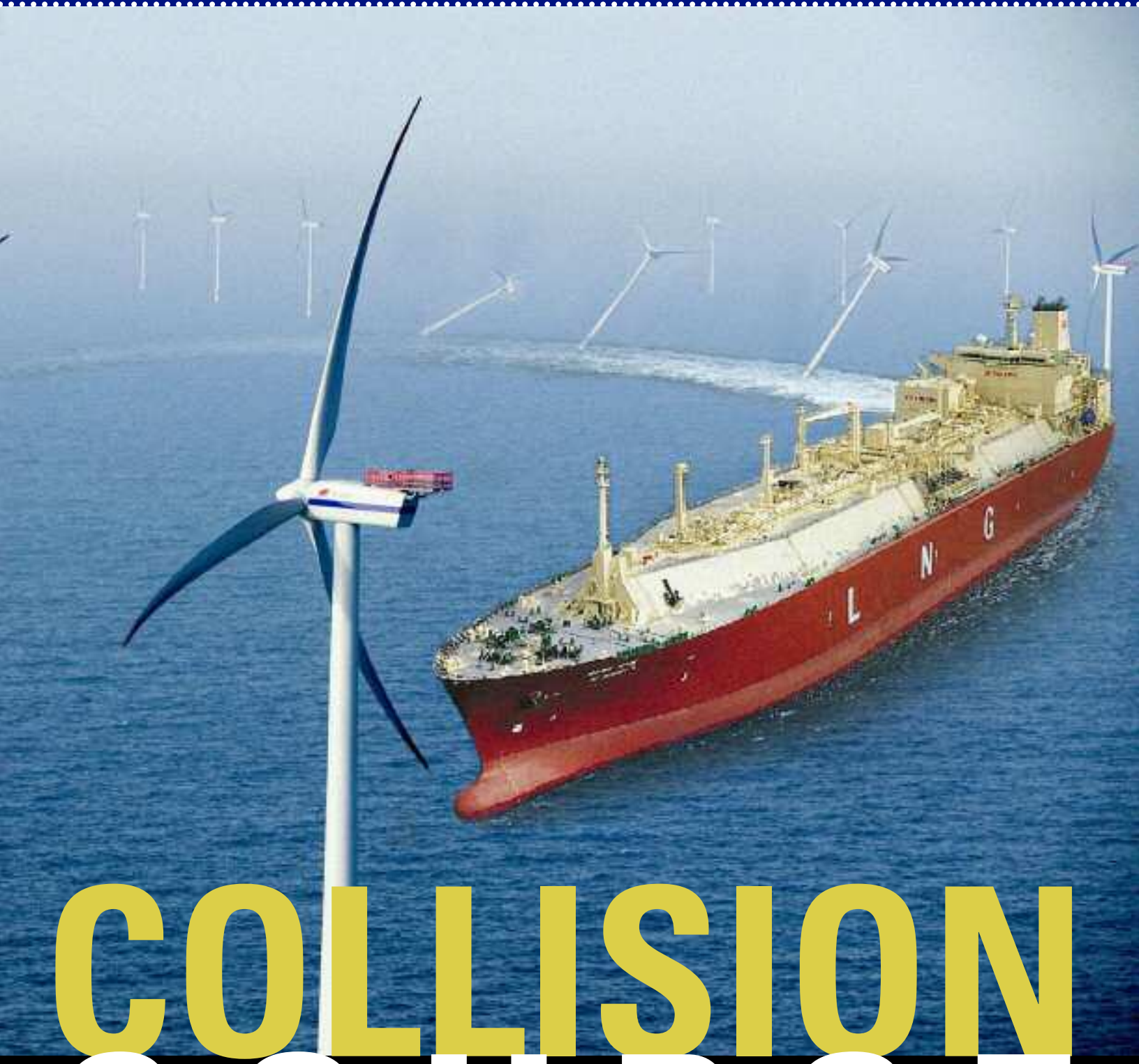

COLLISION COURSE

How Imported Liquefied Natural Gas Will Undermine Clean Energy in California

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Executive Summary

California, the world's twelfth largest emitter of greenhouse gases, stands at a crossroads. At a time of unprecedented public support—and urgent need—for aggressive, responsible action on global warming, plans are afoot to quietly shackle the state to a new dependence on polluting fossil fuels. Instead of reducing greenhouse gas emissions (GHGs), the state pursues policies that will squander billions of dollars on importing liquefied natural gas (LNG) from overseas and prevent any meaningful reduction in greenhouse gas emissions.

LNG's high lifecycle greenhouse gas emissions, severe environmental impacts, and staggering investment costs are at odds with California's commitment to clean energy. Numerous studies demonstrate that investments in cleaner sources of energy, along with improving the efficiency with which we use it, can drive California towards a healthy, prosperous economy.[1] Importing LNG, however, contradicts California's environmental priorities and does not fit within this framework.

California has enough financial resources to support either new fossil fuels or renewable energy, not both. Furthermore, California can choose either to burn more fossil fuels or reduce greenhouse gas emissions, but not both. This report explains the conflict between LNG and clean energy efforts, as well as LNG's greenhouse gas impacts in California and around the world, with the following findings:

- New research demonstrates that the greenhouse gas emissions from LNG, when considering the entire lifecycle of production, transportation, and combustion, can be as bad as coal.
- Building new fossil fuel infrastructure to supply LNG binds California to a multi-billion dollar investment. This investment requires a minimum 20-year commitment of fuel purchases by utilities, and likely longer. LNG is not a transition fuel to renewables; rather, it will heighten our dependence on foreign fossil fuels for at least another generation.
- Sufficient natural gas supply exists in North America to meet California's declining natural gas usage for the next several decades. This fuel burns cleaner and is more reliable than imported LNG. We should not lock the state to a new foreign fossil fuel by means of false scare tactics – propagated by the energy industry – claiming that California needs new sources of natural gas. Responsible and efficient use of North American supplies, while cleaner alternatives are developed, is the best course of action.
- Despite a state Energy Action Plan promoting conservation and renewable energy sources like solar and wind power, California's regulatory agencies alternatively favor increased natural gas dependence.
- While California has an ambitious policy of getting 20 percent of its electricity from renewable sources by 2010 and 33 percent by 2020, the state is far behind in achieving these goals.
- LNG will compete directly with, and likely undermine, renewable energy and energy efficiency programs in California.
- Meeting the state's renewable and energy efficiency goals requires that *all* additional electric generation built between now and 2020, including replacing aging generators, come from renewable sources.
- The scale of financial commitment implied by LNG is similar in size to what is required to meet the state's clean energy goals, but LNG carries much higher environmental, financial, national security, and public safety risks.

Global Warming and California

California is a key contributor to the development of global warming, and California's residents and economy are increasingly vulnerable to its consequences. The 550 million metric tons of greenhouse gases (GHGs) that California discharged into the atmosphere in 2005 would, if California were a country, rank it as the 12th largest emitter of GHGs in the world, emitting more than Great Britain.[2] Costs associated with global warming have already begun to accrue, and future models of climate change expose threats to virtually every sector of the state's economy.[3]

2005 was the hottest year on record worldwide since widespread measurements began in the late 1800s, and the ten hottest years on record have all occurred within the last eleven years. The summer of 2006 broke new temperature records in California and included a brutal heat wave that killed some 140 Californians. A 2004 National Academy of Sciences report predicted that, at the current growth rate of emissions, there will be at least five times as many heat waves in Los Angeles by 2100 and twice as many heat-related deaths compared to current historical averages.[4]

The same study predicted that at least half of California's alpine forests will disappear by the end of the century and that the Sierra snowpack, which is crucial to the state's water and hydro-electric power supply, will decline by at least 29 percent, and perhaps as much as 70 percent. For an economy that supplies a significant portion of the world's agricultural and food commodities, such a reduction in water supplies would be catastrophic beyond California's borders.[5]

California's Leadership Role and Political Will to Fight Global Warming

Against this backdrop of instability and urgency, Californians are increasingly aware of the dangers posed by global warming and are demanding action from policy makers. A 2006 poll from the Public Policy Institute of California showed that 79 percent of Californians saw global warming as a "very serious" or "somewhat serious" threat to the state's economy and quality of life. These findings mirrored those of a national poll conducted in the same year by The New York Times and CBS News.[6] Furthermore, the political popularity of environmental protection, greenhouse gas reduction, and development of alternative energy illustrates that the state's well-educated and informed population is highly aware of the impacts of further fossil fuel dependence.

California Governor Arnold Schwarzenegger

Cleaning up electricity generation, which comprises about 22 percent of the state's emissions, is currently the quickest and most efficient way to dramatically reduce greenhouse gases since the sources of emissions are concentrated in large facilities that are government regulated.[7] Indeed, California is well-positioned to successfully tackle the second largest emissions culprit in the state. California has no fewer than 75 laws, initiatives, and incentives to reduce greenhouse gases by scaling up renewable energy and increasing energy efficiency. These range from the Renewable Portfolio Standard to incentive programs in several cities to promote the installation of solar panels on homes.[8] In 2006, California enacted additional historic clean energy laws. Should the spirit of these laws and initiatives be followed, California has the potential to significantly reduce its contribution of greenhouse gas emissions from electricity production.

AB32, the Global Warming Solutions Act, holds great potential for sweeping change. Approved by the California legislature and signed by Governor Schwarzenegger in September 2006, the law, if adhered to, will cap greenhouse gas emissions at 1990 levels by 2020, a 25 percent reduction from 2006 levels. To meet these goals, 174 million metric tons of greenhouse gases by utilities, oil refineries, steel mills, and other heavy industries must be eliminated. The law requires the California Air Resources Board to adopt regulations to meet the goal. Actual reductions will be required beginning in 2012.[9]

While this law makes California a national leader in the reduction of greenhouse gas emissions, it is not enough to meet the substantial reductions that are required. Mark Hertsgaard writes in *The Nation*, "Returning California's greenhouse emissions to 1990 levels by 2020 is even less ambitious than the Kyoto Protocol, which requires industrial nations to lower emissions approximately five percent below 1990 levels by 2012. And Kyoto's targets are only a tiny step toward the cuts that are truly necessary."[10]

California also has a sweeping Renewable Portfolio Standard (RPS) for electric generation. This law (SB1078) took effect in 2003 and is considered the best in the nation. As originally written, the RPS requires retail sellers of electricity to purchase 20 percent of their electricity from renewable resources by 2017.[11] In 2006, a new state law accelerated the 20 percent target to 2010. In addition, it is also state policy to derive 33 percent of electricity from renewables by 2020.[12]

Certainly, California has an abundance of renewable resources that have only been partially tapped. These include robust wind sites, plenty of sunshine (and empty rooftops) to produce solar energy, a long coastline to capture wave energy, and reliable sources of geothermal power.[13]

However, a contradiction exists between the clean energy laws, the potential of these laws, and the reality of current energy policies that may increase California's reliance on fossil fuels. "When it comes to renewable energy sources such as wind power, California has earned a reputation for providing a lot more words than megawatts," said V. John White, executive director of the Center for Energy Efficiency and Renewable Technologies (CEERT). "Everyone in California is in favor of renewable energy sources, but we can't seem to get our collective act together to get stuff into the ground to actually produce clean electricity." [14]

Clean Energy's Biggest Threat in California: Liquefied Natural Gas

Despite California's commitment to reducing greenhouse gases and promoting alternative energies, state officials are trying to add a new foreign fossil fuel to the state's energy portfolio: imported liquefied natural gas (LNG). LNG is a technology that compresses the volume of natural gas, making it possible to transport the natural gas overseas. Natural gas is drilled from far-off gas fields in places like Russia, Peru, Indonesia, and the Middle

East and then supercooled until it reaches liquid form in expensive liquefaction plants. When the gas turns into a liquid, it takes up a small fraction of the space as the gas. The LNG is then loaded onto a fleet of huge, specially designed tankers and shipped thousands of miles to coastal terminals. Upon reaching its destination, the LNG is reprocessed to its original gaseous form at a regasification terminal.

Each step of this process consumes large amounts of fossil fuel energy, including diesel and natural gas, to move the ships and refrigerate the LNG. The entire process creates significant levels of greenhouse gases, with some estimates indicating nearly 50 percent more than what is emitted when the fuel is finally burned.

A single LNG terminal on the West Coast would tie approximately 15 to 25 percent of California's daily natural gas needs to foreign sources, emit tens of millions of tons of greenhouse gas emissions each year, and commit the state to LNG for decades. In order for LNG to be profitable in West Coast markets, it needs to be purchased with long-term utility contracts that are at least 20 years in length.[15]

Currently, no LNG import terminals operate on the West Coast of North America. There is one LNG export terminal in Alaska that largely serves Japan. One import terminal, financed by Sempra Energy, is under construction in Mexico. Proposals for numerous other terminals, which are all largely driven by the potential to serve California's energy market, run up and down the spine of the West Coast from Mexico to Canada, including three on the Southern California coastline. Without California's energy market, it is unlikely that the out-of-state terminals would be built, as neither the Pacific Northwest, Baja California, nor the other Western states use enough natural gas to make them profitable. These projects have been proposed by Pacific Gas and Electric, Northern Star, Woodside Energy, and others.

The Sakhalin II LNG export terminal in Russia, when completed, will be the largest LNG export facility in the world. Photo: Sakhalin Environment Watch.

The High Lifecycle Emissions of LNG

The LNG industry characterizes LNG as a clean fuel, as if it were identical to domestically produced natural gas. However, LNG emits significant amounts of greenhouse gases, which are commonly attributed to global warming. Natural gas is primarily methane and small amounts of heavier hydrocarbon gases including ethane and propane. When these gases are burned, they produce carbon dioxide and water vapor. Some gas deposits also contain significant amounts of naturally-occurring carbon dioxide. Generally, this carbon dioxide is simply vented to the atmosphere, contributing to global warming.

Most North American natural gas deposits serving California have a low carbon dioxide content of two percent or less. In contrast, Pacific Rim gas fields potentially serving as sources for LNG, specifically in Australia and Indonesia, have high carbon dioxide content, ranging from 10 to 15 percent. This inherent carbon dioxide "debit" further aggravates the climate change implications of importing LNG from these source points when it is vented to the atmosphere.[16] In addition, imported LNG may have a higher content of ethane and propane, both of which emit more carbon dioxide (14 and 20 percent, respectively) than methane does when burned.[17]

Furthermore, the LNG lifecycle adds a significant amount of greenhouse gas emissions above and beyond those produced by domestic natural gas. Substantial additional greenhouse gas emissions are generated in the LNG extraction, liquefaction, gasification, and transport steps. Depending on the quality of the gas and the distance the LNG must travel, LNG crossing the Pacific may add from 12 to 25 percent more greenhouse gas emissions than domestic natural gas.

Every segment of the LNG supply chain emits greenhouse gases:

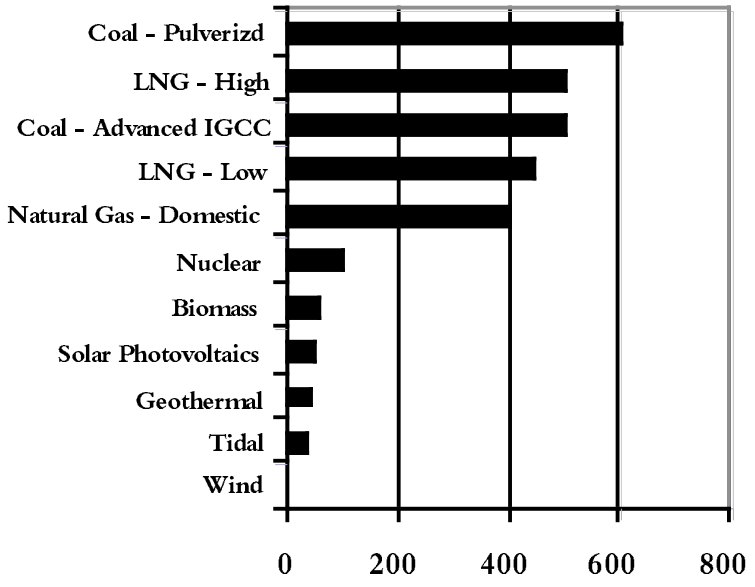
- The liquefaction plants, which are located in the source region of the LNG, use large amounts of energy to generate power and run compressors that chill the natural gas. This uses between nine and ten percent of the natural gas being shipped.[18]
- LNG carriers are propelled by marine diesel fuel and LNG boil-off gas, emitting substantial amounts of carbon dioxide depending on the distance traveled across the ocean; then, the mostly empty ship must return to get more LNG, again burning more fuel. This results in another seven to twelve percent emissions penalty.[19]
- The regasification units at the import terminal use an immense amount of energy to convert the liquid back into a gas. This process uses natural gas, which is burned, emitting carbon dioxide into the atmosphere.[20]
- Production platforms and gas processing facilities routinely "flare" some of the gas, through which the gas is simply burned on site, in open air, and with no emission controls.[21] The flared natural gas is not used for its energy and is thus wasted.

- Throughout the process, methane routinely leaks from gas pipelines, storage tanks, compressors, valves, flanges, and seals. It is also directly vented from the gas processing plant. While routine leaks and vents are not large in terms of mass flow, methane is a greenhouse gas 23 times more powerful than carbon dioxide. According to one study, the natural gas loss through these processes is about 1.4 percent.[22] For the Pacific Connector pipeline project PG&E has proposed for Oregon, the natural gas will travel 223 miles before it reaches the California border. The farther the gas must travel, the more chances there are for leakages to occur.[23]

According to a study of BHP Billiton's Cabrillo Port project, originally proposed off the coast of Southern California but recently rejected by two key state commissions and vetoed by Governor Schwarzenegger, all aspects of the project combined (liquefaction, transport, and consumption of LNG) would have resulted in approximately 25 million tons of greenhouse gases per year, the equivalent emissions of nearly 5 million cars.[24] Researchers at Carnegie Mellon University found that worst-case greenhouse gas emissions from LNG can be nearly as high as those from integrated gasification combined-cycle (IGCC) coal-fired power plants, when both are measured on a lifecycle emissions basis.[25] The variances in LNG emissions in these studies are due to differences in gas quality from different fields and the distance the LNG tanker must travel.

The strongest environmental argument for LNG is that it might displace coal, the worst offender among fossil fuels. But as indicated in graph 1, as well as in the emerging scholarship on LNG's lifecycle, greenhouse gas emissions from LNG rival that of new coal plants under certain circumstances.

Graph 1: Comparison of Lifecycle Greenhouse Gas Emissions[26]



Global Warming Gas Pollution: Grams per Kilowatt Hour

The Multiplier Effect of Emissions in India and China

The lifecycle environmental impacts of an LNG-dependent California extend even farther beyond the cumulative emissions released into the global atmosphere from each step in the supply chain. Should the US become a dominant player in the international LNG market through West Coast use, global price competition for LNG will further increase. Such increases will drive developing and rapidly industrializing countries like China and India away from LNG and towards cheaper and more polluting fossil fuels like pulverized coal. This, in turn, elevates emission levels on a global level. Participants at the *2007 Flame Energy Conference* confirmed this scenario.[27]

As discussed at the conference, soaring construction costs, sustained higher oil prices, and a projected shortage of LNG before 2012 has emboldened producers such as Indonesia, the world's biggest LNG exporter until 2006, to demand significantly higher long-term prices from consumers. Indonesia is now seeking to renegotiate the price of an LNG deal to South Korea, less than a year after it forced a major Chinese customer to pay more.[28] And while demand for LNG from countries like Japan, where electricity needs are growing, is likely to continue even at the high prices, industry analysts predict some of the world's fastest growing energy consumers, such as China and India, might not be able to cope with the rising LNG prices and will opt for alternative sources.[29]

Given that their in-country coal sources are far less expensive, industry analysts predict that as the price of LNG rises, the alternative energy source for China and India will be coal. Recent price increases in LNG have resulted in delays in LNG import terminals, as Chinese companies attempt to negotiate long-term LNG supply agreements.[30] Thus, while LNG in California will likely displace efficiency and renewable energy, it could replace pulverized coal in China and other growing economies if it were competitively priced. While LNG is highly polluting, it is an improvement over highly inefficient pulverized coal plants in China and India. The net result of increased California consumption of LNG will likely be an increase in greenhouse gas emissions from California *as well as from developing economies*. Thus, California's energy choices would have a multiplier effect far beyond the state's borders.

In a presentation to the California Energy Commission, LNG consultant James Jensen outlined a similar scenario, adding that LNG supplying countries such as Indonesia, Qatar, Trinidad, and Nigeria will likely reduce their output, with Australia making up for the loss in existing LNG markets around the Pacific Rim. This will leave the former Soviet Union and the Middle East, primarily Iran, as LNG suppliers for the West Coast.[31] All of this will lead to higher prices for LNG globally.

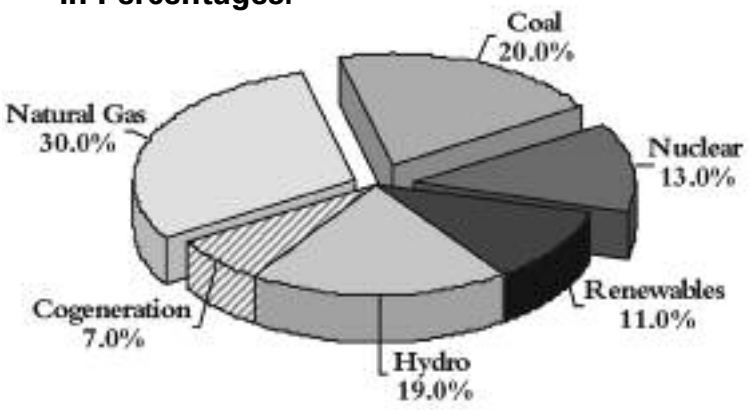
LNG Imports would Displace Clean Energy

California's energy policies and markets bring natural gas and renewables into direct competition. Importing LNG would bring a flood of new natural gas into the state, and it would limit development of clean energy.

Production of electricity is central to this dynamic, since half of the natural gas in the state is used for electric generation, making electric generation by far the largest consumer of natural gas fuel.

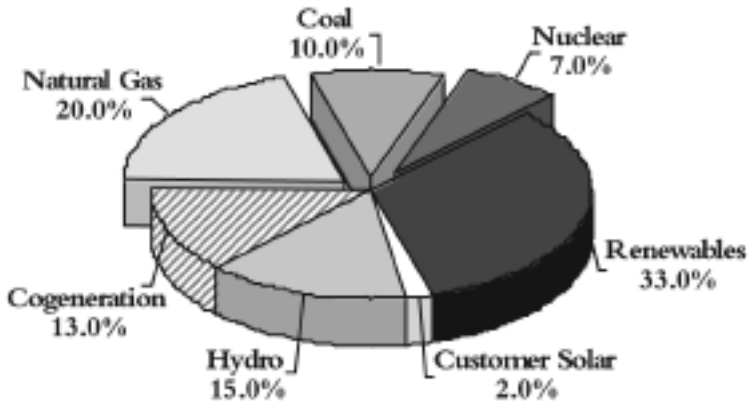
California's electricity is derived from power plants burning natural gas and coal, large hydroelectric dams, and nuclear power. Renewables – primarily solar, wind, and geothermal energy – comprise eleven percent of the electric energy pie, as of 2005 (see Graph 2). Graph 3 illustrates how California's energy portfolio will look in 2025 if clean energy laws are fully implemented as the next section details.

Graph 2: California Gross System Power for 2005, in Percentages.



Source: California Energy Commission

Graph 3: If We Do the Right Thing – California's Clean Energy Portfolio in 2025



How California Can Do the Right Thing

Nuclear Energy in California: California derives 13 percent of its electricity from nuclear energy, significantly less than the national average of 19 percent. Due to numerous problems, including high repair bills, earthquake risks, and a near meltdown, five nuclear generating units that formerly produced nearly 1,500 megawatts of power in the U.S. have been closed. This leaves two large nuclear power plants in California and a portion of a large plant in Arizona that contributes to the state's electric supply. The two in-state plants are scheduled to remain in operation until 2024, by which time growing demand for electricity will have shrunk the relative role of nuclear power to about ten percent. California's two largest utilities are applying for extensions for their nuclear plant licenses until 2040, now pending at the Nuclear Energy Commission. However, there are questions about whether these extensions will be approved, and a state law prohibits construction of new nuclear plants.

Pursuing California's commitment to clean energy, which includes the 33 percent share of renewables, the planned billion dollars per year investment in improving efficiency in the electric sector, the California Solar Initiative, and the expansion of cogeneration, will allow for a phasing down of nuclear power in the future, while also scaling back the use of fossil fuels.

Hydropower in California: The state is committed to electricity derived from large hydropower projects, both because of the infrastructure investments already made to build the dams decades ago and because it is a relatively inexpensive source of energy. Other than a few controversial hydro projects, such as Hetch Hetchy's O'Shaughnessy Dam and those along the Klamath River with low generating capacity, there is no serious movement to decommission the large dams the state is now using for 19 percent of its electricity.

In addition, there is evidence that decommissioning these dams will have little effect on total energy supplies. One report showed how 90 percent of electric generation could be maintained from Hetch Hetchy power houses, even if the O'Shaughnessy Dam is dismantled.[32] The Klamath decommissioning would result in the loss of 200 megawatts of power in Oregon. This compares with over 14,000 megawatts of hydroelectric capacity in California. Nevertheless, growing energy demand and the effect of climate change may reduce the

Table 1: Nuclear Power in California: A History of Closure

Plant	Location	Issues	Status	Size (MW)
Santa Susana Experimental	Ventura Co.	Partial meltdown, Leaked radiation	Closed 1964	7.5
Vallecitos	Pleasanton	1st U.S. Decommission	Closed 1967	30
Humboldt Bay	Eureka	Seismic Safety	Closed 1976	63
Rancho Seco	Sacramento Co.	Referendum, repair cost, performance	Closed 1989	913
San Onofre unit 1	N. San Diego Co.	Repair Costs	Closed 1992	436
Diablo Canyon units 1 & 2	San Luis Obispo	$1 billion repairs needed	Operating	2160
San Onofre units 2 & 3	N. San Diego Co.	$1 billion repairs needed	Operating	2150

Source: California Energy Commission, http://www.energy.ca.gov/nuclear/california.html

role of conventional hydroelectricity. Our model projects this source of electric power to fall from 19 percent to 15 percent of total supply.

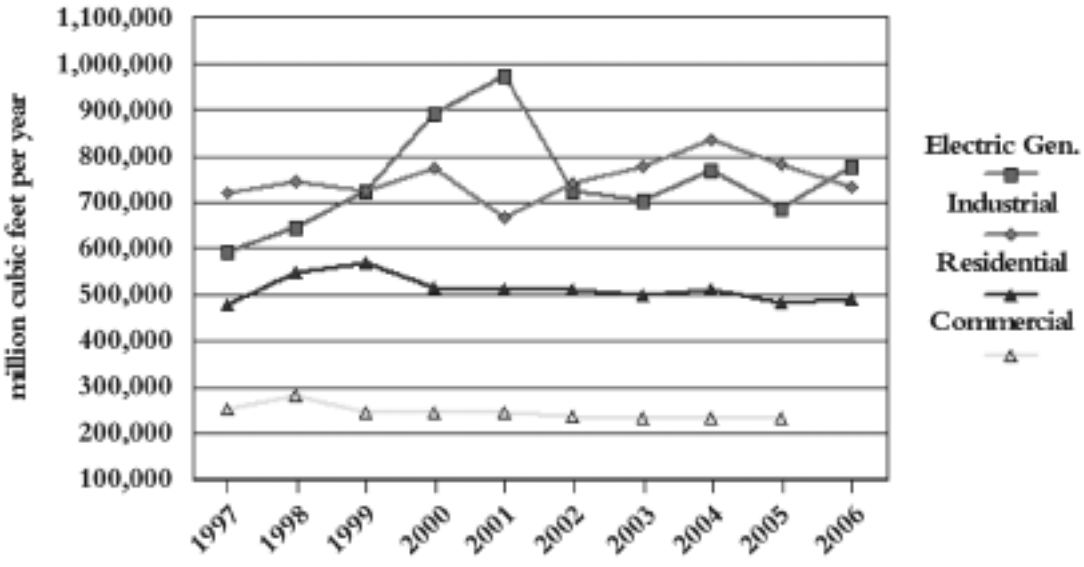
LNG will not Displace Coal in California: Some argue that the state needs LNG in order to phase out reliance on coal. However, this argument has several shortcomings. California only gets 20 percent of its electricity from out-of-state coal, compared to 50 percent for the U.S. as a whole. The electricity the state does derive from coal is often contracted on a long-term basis. According to a recent law, new long-term coal contracts must supply sources that do not exceed carbon dioxide emissions from natural gas power plants established by the California Energy Commission; the limit is 1,100 pounds of carbon dioxide per megawatt-hour generated.[33] There is no existing coal combustion technology that can come close to this standard without sequestering significant amounts of carbon dioxide, and there is much controversy about whether this is even possible.

Furthermore, the new limits on greenhouse gas emissions, combined with growth in total energy consumption, will work to slowly reduce the relative role of coal in California's energy mix. As demonstrated in the models on page 11 (see graph 2 and 3) this can be accomplished while simultaneously reducing the use of natural gas.

Natural Gas in California: Whether California's clean energy policies are fully successful or not, even a modest effort to meet the targets set by utility companies and state regulators will mean a decrease in demand for natural gas as a fuel source in the electric sector (which will be detailed later in this report). An additional important factor, not illustrated in the charts on page 11, is the reduced need for natural gas to run more efficient natural gas power plants as they are upgraded with state-of-the-art, combined-cycle technology.

LNG will Increase Reliance on Fossil Fuels and Displace Clean Energy: Compare the scenarios above with one in which new LNG is poured into California. In order to sell LNG, vendors will need long-term contracts with buyers. As there is no real growth in demand for natural gas from any sector (see Graph 4 below), only electric generation could guarantee a market with full cost recovery, over a period of decades, from customers whose bills are under the control of a government agency.

Graph: 4: Natural Gas Consumption in California

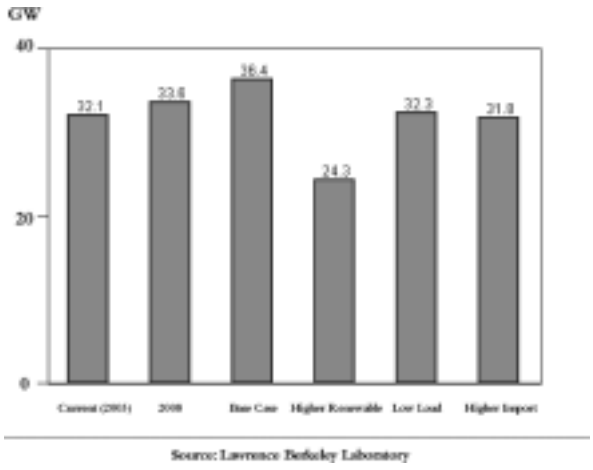


Source: US Energy Information Administration

Proponents say that LNG is needed to meet rising energy demand, including the need for more "clean" electricity generation. *But if the state is to meet its targets for energy efficiency and renewables, all new sources for electricity production need to be renewable until at least 2020.* There is simply no room for any new natural gas, or other non-renewable energy sources, in the electricity sector at all. This is borne out by numerous studies.

A study performed for the California Energy Commission by Lawrence Berkeley Laboratory in 2003 examined the effect of a 33 percent renewable standard on the need for natural gas power plants to meet the state's electricity needs. They concluded that about 8,000 megawatts of existing natural gas plants would need to be eliminated.[34]

Graph 5: Gas Fueled Generation Capacity
Current and for 2030 Under Different Scenarios



Source: Lawrence Berkeley Laboratory

The first bar on the left in Graph 5 above indicates that California's natural gas electric generation capacity in 2003 was 32.1 gigawatts. As illustrated by the "Higher Renewable" scenario, if a 33 percent renewable standard is adopted by 2030, ten years later than actual state policy, only 24.3 gigawatts of gas-fired generation power plants would be needed. This reduction in natural gas electric generation capacity would eliminate 20 large power plants.

A report by the Community Environmental Council concluded that California could dramatically reduce natural gas usage, "just by following plans that the state and the utilities already have in place." The Council also concludes that clean energy efforts in California can produce the energy equivalent of 133 percent to 381 percent of the projected additional gas demand by 2016. The high end of that range is the equivalent of about 2.5 LNG terminals.[35]

In a 2003 report, the California Energy Commission's staff detailed how natural gas demand growth can be reduced, or even reversed, if achievable electric energy efficiency goals and the 20 percent by 2010 renewable legal requirements are met. These energy efficiency goals, set in 2003, total 7,000 gigawatt hours (GWh) per year of savings from all energy efficiency programs by 2006, 13,000 GWh by 2008, and 30,000 GWh by 2013.[36]

According to an analysis of the Energy Commission's study by Synapse Energy Economics, achieving the energy efficiency goals recommended by Energy Commission staff and accelerating the Renewable Portfolio Standard to 20 percent by 2010, which is now California law, could reduce electricity usage in California in 2013 by an additional 25,000 GWh. Meeting these requirements would reduce the demand for natural gas for electricity production by about 155 billion cubic feet per year.[37] This is roughly the production volume of one LNG terminal.

All of these reports envision an energy future with dramatically reduced fossil fuel dependence, while adding no new dependence on nuclear energy. Mitigating climate change requires California to choose between fossil fuels or clean energy. The nature of California's energy portfolio only allows growth from one source, not both.

The California Energy Commission's Natural Gas Addiction

Despite a sizable body of evidence to the contrary, the current view of the California Energy Commission (CEC) is that natural gas demand is increasing in California, and only importing LNG can satisfy demand. This is reflected in a draft of the Natural Gas Market Assessment for the 2007 CEC Integrated Energy Policy Report (IEPR), which concludes that natural gas demand "could grow" by 1.1 percent per year between 2007 and 2017, even with increased renewable generation.[38]

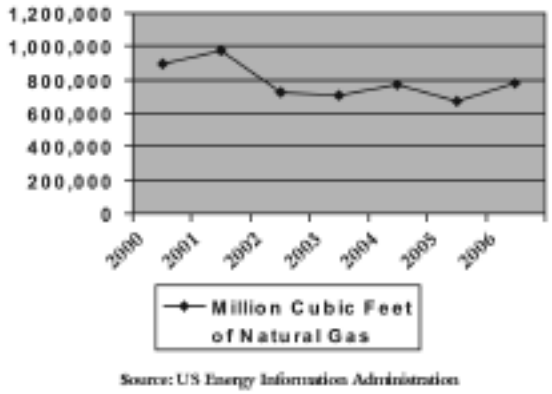
The report's finding is surprising, given that there has been a nine percent decrease in total natural gas usage since 2000, and a 20 percent decrease in natural gas usage for electricity generation, despite a seven percent growth in California's population (see Graph 6). On a per capita basis, each Californian used almost 14 percent less natural gas in 2006 than they did in 2000.[39] The CPUC and CEC (in other reports) attribute this to the following: 1) greater efficiency measures, 2) greater investments into renewable energy, and 3) the rising price of natural gas since 2000 which has motivated users to be more efficient.[40]

Not even the state's major utilities are in agreement with the CEC. According to projections made by the state's three major utilities in their Natural Gas Report, all are expecting a slight decline in natural gas usage through the year 2015, with demand declining from 6,173 million cubic feet per day in 2006 to 6,099 million cubic feet per day in 2015. Unlike CEC data, this report is subject to an evidentiary legal process at the CPUC.[41]

California is Building New Natural Gas Power Plants even while Demand for Them Decreases Although the use of natural gas has dramatically decreased in California, the CPUC is approving an excessive number of gas-fired power plants. In planning documents published by the CPUC and the CEC, it is asserted that rising electricity demand will be met by increased power production from natural gas-fired power.[42] The California Integrated Energy Policy Report of 2005 reports: "Although Californians continue to use electricity more efficiently, total electricity demand is growing, requiring additional power plants to meet the state's needs. Since November 2003, the state has permitted 11 power plants totaling 5,750 MW of capacity, primarily natural gas-fired." [43]

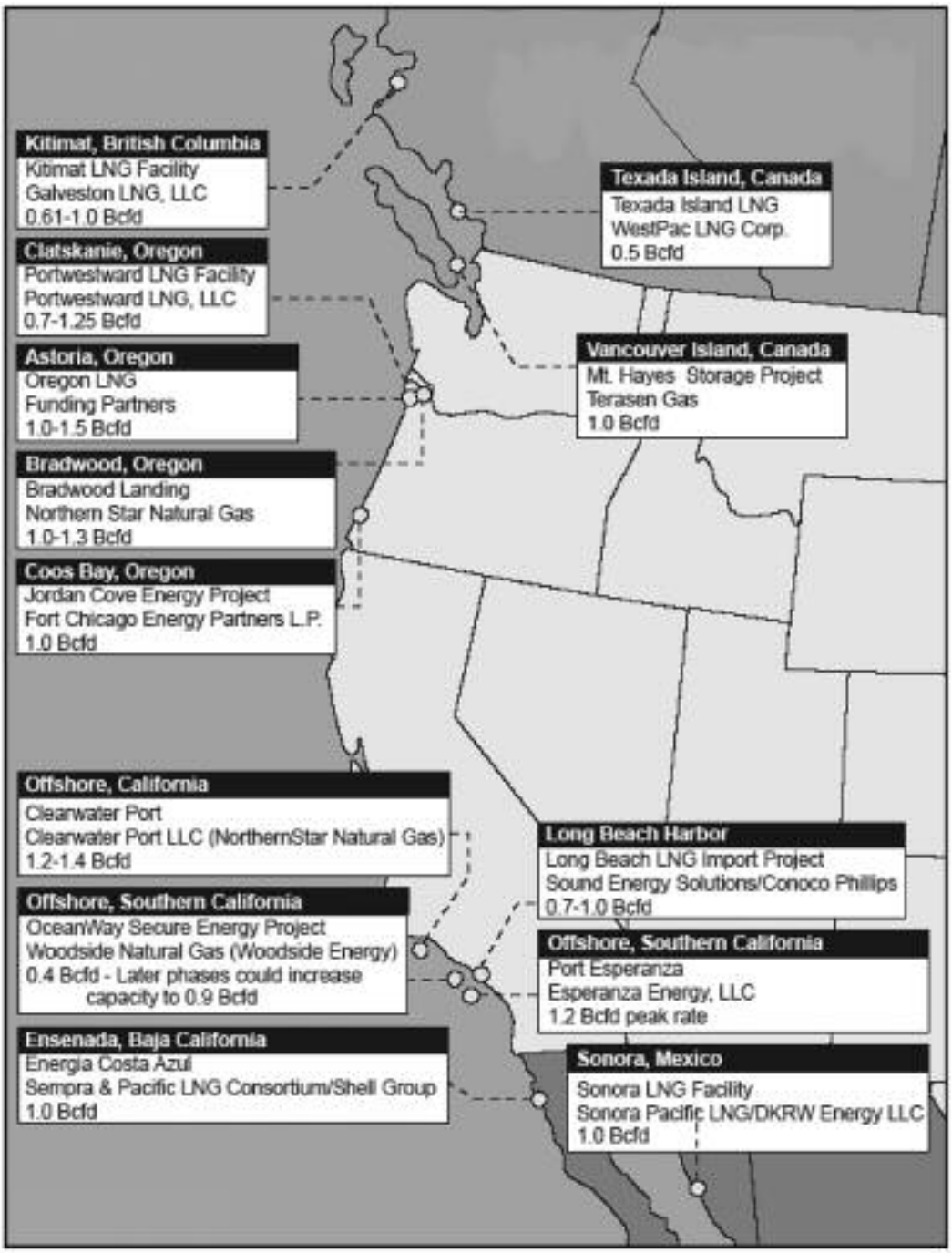
Much of the CEC's analysis, and the proceedings that go into the analysis, are done without any serious examination of the impact that the state's clean energy laws have had, and will continue to have, on reducing natural gas demand. Assuming continued growth of efficiency measures and renewable energy, as seen in graphs 2 and 3 on page 11, natural gas reductions will continue. California's state energy agencies seem blind to this likely scenario, and they view LNG as the only solution to an increase in demand that is based on questionable forecasting methods.

Graph 6: Natural Gas Use for Electricity Generation in California



Source: US Energy Information Administration

Location and Capacity of Proposed LNG Import Terminals on the West Coast



California Energy Commission, August 2007

Import at Your Own Risk: Safety, Health and Environmental Consequences of LNG

In addition to contradicting California's environmental policy goals and contributing to greenhouse gases, importing LNG involves serious risks to both the global and state environment and economy. LNG terminals create significant air pollution, pose a serious security threat to neighboring communities, and facilitate the 'outsourcing' of severe environmental and social problems to other countries.

- **Natural Gas Combustion Emits Air Pollutants.** LNG terminals will add to regional air pollution problems, creating their own emissions from the regasification process, tankers, and other associated marine traffic such as Coast Guard protection. Air pollution from natural gas power plants, such as nitrogen dioxide and particulate matter, are known to lead to increased numbers and intensity of asthma attacks.[44] As an example, the cancelled Cabrillo Port LNG terminal off the coast of Oxnard would have emitted at least 200 tons of smog-producing pollutants per year.[45]

- **LNG Terminals and Tankers Pose Dangers and Unnecessary Risks.** LNG is highly flammable once it vaporizes, and LNG leakage can be extremely flammable. According to a 2004 study by Sandia National Laboratories, a terrorist attack on an LNG tanker would cause "major injuries and significant damage to structures" a third of a mile away and could cause second degree burns to people more than a mile away. Dr. Jerry Havens, the Director of the Chemical Hazards Research Center at the University of Arkansas, concluded that "if about three million gallons of LNG spills onto the water from an LNG tanker ship, flammable vapors from the spill could travel up to three miles."[46] A 2004 accident at an LNG export facility in Skikda, Algeria resulted in an explosion that killed 27 people, injured 74, and shattered windows up to five miles away.[47]

- **LNG Creates Environmental Sacrifice Zones Around the World.** LNG extraction has resulted in some of the world's most environmentally devastating projects. On Sakhalin Island in the Russian Far East, Royal Dutch Shell has been extracting oil and gas in a pristine marine environment that is home to the critically endangered Western Pacific gray whale. The Sakhalin II project has been mired in problems, including massive fish die-offs, two significant oil spills, and contamination of the local water supply. It has led to widespread protests by local residents, as well as blockades led by indigenous peoples who have seen their subsistence economies eroded by oil and gas drilling and pipelines. These problems provided the pretext for a takeover of a majority share of the project by the Russian Government-owned Gazprom in 2006.[48] In the Camisea gas fields in Peru, a gas project is opening up one of the most pristine rainforest valleys in the Amazon, threatening the livelihoods of riverine native communities and the physical survival of isolated indigenous peoples.[49] In Australia, gas development is threatening marine coral reef habitats, as well as the rich biodiversity of Barrow Island, commonly known as "Australia's Ark."

The Real Costs of LNG: The Economic Implications of Importing LNG

If California commits to LNG, the state leaves ratepayers vulnerable to inflated energy costs. The LNG industry touts LNG as a cheaper alternative to domestic natural gas, claiming that it will bring competition. However, high infrastructure and production costs will inflate the price of LNG over domestic natural gas. Furthermore, relying on volatile foreign sources of natural gas ensures a higher degree of instability in both price and delivery. Currently, California gets its entire natural gas supply from North American sources; importing LNG would be the beginning of a new reliance on foreign sources of fuel.

Infrastructure Costs, Rising Fuel Costs, and Ongoing Production Costs

The myth of LNG as being cheaper than domestic natural gas unravels once the high initial infrastructure costs, rising fuel costs, and ongoing production costs are taken into account. While energy analysts in the early 2000s were exuberant about what they reported as being the low cost of LNG, analysts recently have been increasingly pessimistic in their projections of price.

The level of financial commitment entailed by just one LNG port is staggering. With a capacity for a typical LNG proposal being one billion cubic feet per day and average minimum deliveries at least twice per week, it is reasonable to expect a minimum of 200 billion cubic feet of imports per year. The cost of simply bringing this gas through the terminal, assuming a cost of $5 to $8 per MMBTU, would be between $1 billion and $1.6 billion per year, as detailed in Table 2. This is a conservative estimate – it could be higher than this range, given the increasing prices for LNG contracts being signed around the Pacific Rim. LNG contracts are typically signed for a 20-year purchase commitment, which would mean a total cost between $20 billion and $32 billion.

This initial cost is only the beginning. Other investors in the LNG supply chain include pipeline operators, utilities, and power plant operators. As an example, Jordan Cove LNG has indicated that the LNG for its proposed Southern Oregon terminal will come from a project Gazprom and Shell are developing on Sakhalin Island, Russia. Much of this could be sold to PG&E utility customers in Northern California. In this case, the following corporations will all be making a profit off of the project and adding to the cost:

LNG Supplies – Sakhalin Energy: A consortium of Gazprom (Russia), Shell (Netherlands), Mitsubishi (Japan), and Mitsui (Japan)

LNG Terminal Operation – Jordan Cove LNG (Owned by Fort Chicago, a Canadian Company)

Pipeline Operation – Williams Pipeline (Oklahoma) and PG&E Corporation (California)

Power Plant – The natural gas from the LNG terminal would arrive at any number of natural gas power plants to create electricity, all of which are privately owned. Possible operators could be Mirant, Dynergy, Cal-Pine, and others.

Utility Sales to Electric and Natural Gas Customers – PG&E Company

We estimate that one LNG port, used to supply new electric power generation plants, will cost California ratepayers over $3 billion per year on their electric bills.

Table 2: Assumptions about LNG Import from One Port Used for Electric Generation

Capacity of Port	1 billion cubic feet per day
Operational Capacity	55%
Annual Imports	200 billion cubic feet
Annual Cost @ $5 per thousand cubic feet	$1 billion
Annual Cost @ $8 per thousand cubic feet	$1.6 billion
Heating Value	1,020 btu/cubic foot
Annual Thermal Content	204,000,000 mmbtu
Average Heat Rate for Electric Generation	8,400 btu/kilowatt-hour
Annual Electric Generation	24,286,000,000 kilowatt-hour
Average Retail Electric Rate	14 cents per kilowatt-hour
Annual Retail Value of Electricity from LNG	$3.4 billion

Factors for this cost include:

1. High Infrastructure Costs: Every part of the LNG supply chain is expensive. In addition to the normal costs of exploration, drilling, and building pipelines, LNG requires liquefaction plants costing billions of dollars, a fleet of ships, and a receiving and processing port on the delivery end.

Furthermore, a survey of upstream projects shows that construction prices have been spiraling out of control, and projects have been delayed. Bloomberg reports, "The cost of building LNG plants has tripled in six years, according to Bechtel Group, the biggest U.S. contractor. The Gorgon project on Barrow Island, off northwest Australia, is projected to cost as much as $19.2 billion….Shell's Sakhalin II LNG in Russia has doubled in cost to more than $20 billion. Norwegian group Statoil's Snohvit LNG plant will cost $9.5 billion, almost 50 per cent more than first anticipated in 2002." [50] The port where LNG is delivered poses an additional expense. The estimated cost for the LNG port recently rejected by Long Beach totaled $700 million, while the cost of an LNG tanker is estimated to be about $175 million.[51]

Photo: Brett Millar

The Sakhalin II project is expected to process about 500 billion cubic feet of natural gas per year into LNG, or 15 trillion cubic feet over a 30-year lifecycle of the liquefaction plant. Assuming that the builders want to make a profit, the cost of the liquefaction plant by itself will amount to about $5.50 per MMBTU of natural gas fuel. Accounting for extraction, shipping and reprocessing on the West Coast of the U.S., it is unlikely that any fuel could be delivered for less than $7.00 per MMBTU, which is considerably higher than the base price estimated by LNG supporters of around $4.00 per MMBTU.[52]

2. Rising Fuel Costs and Supply Instability: The global demand for LNG is rising, and by all indications the producing nations are taking advantage of this by raising the price of LNG. Meanwhile, nations that are already receiving LNG shipments are competing for supplies by making higher bids.

For example:

- According to Reuters, deliveries of LNG for far into the future have been sold at a record level. A surge of projects has helped to raise the cost of bringing on new supplies, meaning some schemes may no longer be viable. LNG production in 2006 has been estimated at roughly 160 million tons and is on course to double by the end of the decade. However, there is great uncertainty about whether capacity will be subsequently adequate, a factor that is helping to persuade customers to pay high prices. LNG experts say the highest long-term deal so far was struck between Korea Gas Corp and Qatar's Rasgas (a joint venture between Qatar Petroleum and ExxonMobil). Sources quoted in Reuters say the 20-year deal was signed in November 2006 for LNG at around $11 per MMBTU. By comparison, the price of natural gas in June 2007 in the United States has ranged from $6.50 to $7.50 per MMBTU.

- In April 2007, a summit of many of the world's gas producing nations, including Russia, Iran, Qatar, Indonsesia, Venezuela, Libya, and eight others caused increased speculation that an OPEC-like natural gas cartel may be in the early stages of forming. While this did not formally occur at the summit, experts do believe that such talks may be a prelude to a cartel that could develop over the coming years. Collectively, these 14 countries own 73 percent of the world's natural gas reserves.[53]

- Taiwan, Asia's third-biggest importer of liquefied natural gas, cut its 2010 demand forecast for the fuel by almost 20 percent amid a potential shortage of global supplies over the next five years.[54]

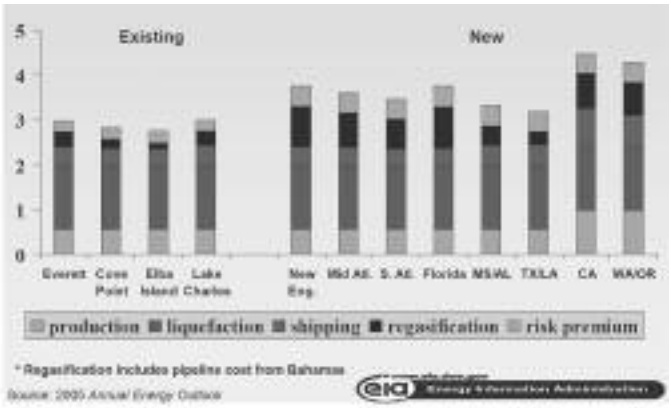
- According to Market Watch, Indonesia is considering increasing liquefied natural gas supply to its Japanese and South Korean customers by diverting up to 30% of the 3.7 million metric tons from the Tangguh project that has already been committed to Sempra's Costa Azul LNG terminal in Baja California, Mexico. Indonesia has been the largest LNG supplier to Japan, but recently the country has repeatedly failed to deliver contracted amounts due to the drying up of output at its Bontang project.[55]

- In Bolivia, the government recently announced that foreign energy companies can no longer book Bolivian natural gas reserves as their own. This is the next step in a trend towards nationalization of the country's gas fields, which stems from the 2005 toppling of the government that was largely fueled by anger over the plan for Bolivia to export LNG.[56] Before the popular uprising, Bolivia was widely considered to be a major prospective source of LNG; however, that is no longer the case.

- In a May 2007 presentation to the Institute of the Americas, Darcel Hulse, the CEO of Sempra Energy, projected that the price of LNG in Asia will be about $13 per MMBTU before 2010. According to the same presentation, natural gas will trade in North America at about $8 per MMBTU.[57]

3. Production Costs: In addition to the high initial cost of building liquefaction plants, ships, and re-gasification plants, the ongoing cost of producing LNG is much higher than that of natural gas. As seen in Graph 7 below, the entire production cost of LNG – extraction from a foreign gas field, liquefaction, transportation, regasification, and risk premium – will be higher in California than any other region of the U.S. According to this chart, the base production price of providing LNG to California will be about $4.75 per MMBTU. *This chart only accounts for the production cost.* It does not take into account the increased cost that can be added by the fickle market forces, supply problems, or potential market manipulation. Compare this to the average production cost of North American natural gas, which is less than $3 (not to be confused with the wellhead cost, which is higher).[58]

Graph 7: Components of Minimum Regional LNG Trigger Prices by Region
(2003 dollars per thousand cubic feet)



The Role of Market Manipulation in Creating a Demand for LNG

LNG companies are creating a market for LNG by exaggerating fears of natural gas shortages and rising demand and by restricting domestic natural gas from access to California's market.

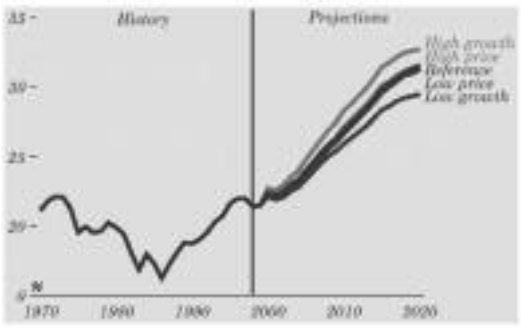
LNG companies are not proposing to bring LNG to California to fill a need in the energy sector; rather, they are actually creating a false market for the new foreign fossil fuel. The LNG industry is strategically inflaming the public's fears of natural gas shortages, re-routing domestic natural gas sources, and not renewing contracts for domestic natural gas in order to ensure a place for LNG in California's energy portfolio.

False Perceptions of Natural Gas Shortages

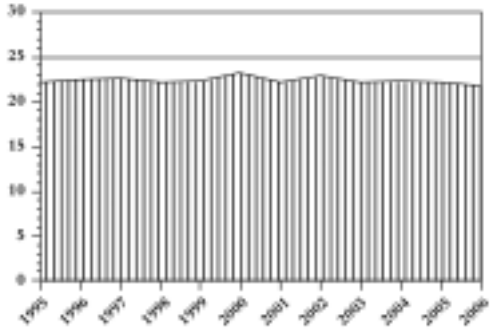
California currently meets nearly all of its natural gas needs with North American natural gas production, delivered through a network of pipelines. LNG promoters are propagating the myth that North American supplies are expensive and increasingly scarce, in turn promoting the importation of LNG to replace or supplement the state's purchases of North American natural gas. In general, these projections of "shortfall," particularly those of government agencies and the petroleum industry, are based upon the assumption of increasing demand. However, the long-term demand growth never seems to materialize, and consumption of natural gas today in the U.S. is the same as it was in the 1970s.

The U.S. Department of Energy (DOE) states there is enough natural gas in the lower 48 states to supply demand for many decades. A 2003 report states the following: "At current rates of consumption, the Nation has at least 60 years worth of natural gas supplies that are recoverable with current technology." [60] The DOE has also reported that there are almost 7,000 trillion cubic feet (TCF) of natural gas in the U.S. Rocky Mountains, with more than 300 TCF currently recoverable. By way of comparison, California consumes approximately 2 TCF of natural gas per year.[61]

Graph 8: 1999 U.S. Government Projections... (trillion cubic feet)



Graph 9: ...And What's Happened So Far
U.S. Natural Gas Consumption



Data: Department of Energy, Energy Information Administration

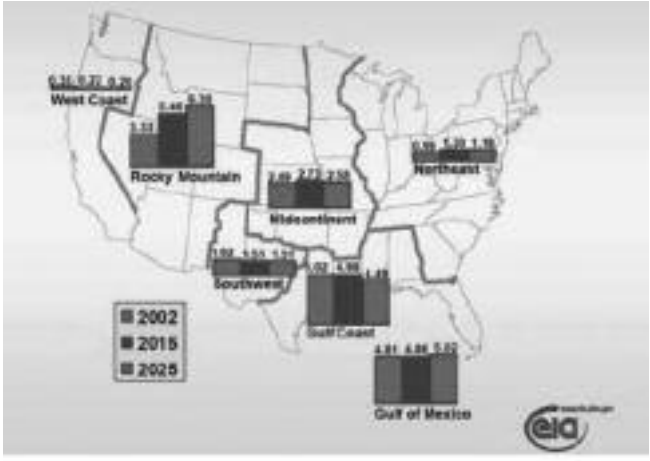
A Clean Fossil Fuel?

Natural gas is often characterized as a benign energy fuel with a minimal environmental impact. However, nothing could be further from the truth. Burning natural gas that has not been transported overseas emits about half of the greenhouse gases as coal. However, overdependence on this fuel will still exacerbate global warming.

Also, while this report details how domestic natural gas can meet California's demand, it is important to recognize the impacts that drilling for natural gas has in North America. Gas drilling, especially some of the new techniques that are used to extract coalbed methane, has devastated much of the biodiversity of the Rocky Mountains and the Southwest. Information on this, and on the best practices for drilling for gas, are available at the Western Colorado Congress website: http://www.wccongress.org/oilngas.htm

The report underscores the reason why California must stay on track with phasing out all fossil fuels. Natural gas may be the "least dirty" of the fossil fuels, but it is by no means "clean."

Regional Natural Gas Production, 2002, 2015, 2025 (trillion cubic feet)



Map demonstrates rising production to 2015 in Rocky Mountains, Mid-Continent, Gulf of Mexico, and Northeast. Source: Energy Information Agency.

Perceptions of Shortages, Not Real Shortages, Affect Gas Prices. Energy companies further inflame these perceptions of gas shortages by manipulating market prices. The lack of a relation between natural gas supply and price was detailed in a report conducted by the Attorneys General from four Midwestern states, who investigated why their constituents paid exorbitant prices for natural gas in the winter of 2005-06. *Their study concluded that despite the damage to natural gas production from Hurricane Katrina, the price increases had much more to do with energy deregulation than any shortages.*

Among the report's findings:

- Nationwide demand for natural gas has not been surging. For the last ten years, it has been relatively flat, even declining in the last three years.
- The cost of producing gas is far below the price being paid for gas by ratepayers.
- Supply and demand did not change much from 2004 to 2006. Gas storage rates are now at record levels, and were quite high throughout the winter of 2005-06, regardless of the hurricanes in 2005.
- Although the laws of supply and demand would suggest that prices in 2006 should have been similar to, or lower than, prices in 2004, prices were up over 60 percent.
- The last 15 years of energy deregulation has led to an increase in the amount of trading. This leaves gas vulnerable to price manipulation.
- The previous point is partly explained by the fact that "over-the-counter" derivatives markets, reported in unaudited, unregulated indices, are a major factor in setting the price of natural gas. These markets have behaved very poorly in recent years, with numerous instances of misreporting of prices. [62]

Because of the complicated nature of natural gas markets, much of the blame has been focused falsely on geology (tightening supplies) and weather (hurricanes). These factors have been overempha-

sized in the press, which published many stories about impending energy price spikes in fall of 2005. This fed into the market's hysteria, resulting in even higher prices.[63]

The reality driving the current volatility in the natural gas market is partly the artificial link between natural gas prices and the petroleum market and partly the manipulation of the natural gas trading markets.[64] Neither of these phenomena are limited to the U.S., as elevated natural gas prices are global in nature. Thus, importing LNG will do little to address the problem of high prices, a fact borne out clearly by historical price data. The reason for this is clear: LNG is highly mobile and will be sent to the market where it can fetch the highest price.

Sempra's Big Takeover

The role of self-interested corporate influence in creating space for LNG in the California utility market is best illustrated by decisions made by the California Public Utilities Commission (CPUC) that favor the plans of San Diego giant Sempra Energy to import LNG to serve the Southern California natural gas market.

In 2004, the CPUC approved a critical ruling that allows California's three natural gas utilities, including Southern California Gas Company and San Diego Gas & Electric, both of which are owned by Sempra, to enter into long-term supply contracts for LNG. In the same ruling, the CPUC allowed Sempra's utilities *the right to not renew contracts for domestic natural gas so these utilities can enter into LNG supply contracts*, in essence favoring LNG from abroad over supplies from the Western U.S. and Canada. The CPUC also denied an appeal by the coalition Ratepayers for Affordable Clean Energy (RACE) to hold public, evidentiary hearings to establish the need for LNG in California. In effect, the CPUC created an artificial long-term market for LNG in California despite the fact that the CPUC received numerous on-the-record submissions from North American gas producers indicating they could continue to supply the state with natural gas.[65]

Now under construction, Sempra's Costa Azul terminal has destroyed a once-pristine beach in Baja California. Photo: Serge Dedina

Almost immediately after the CPUC's favorable ruling for Sempra, the company was able to secure a line of credit from Citibank to begin construction on the Costa Azul terminal on the Baja coast. Four years later, the project that will redefine California's natural gas landscape is about 80 percent complete, according to the company.

More recently, Sempra Energy, with Kinder Morgan, began construction on a pipeline project that will move natural gas eastbound from Wyoming to Ohio, and away from their Southern California utility customers. Wyoming and the Rockies are the major centers of domestic natural gas production growth in the West and currently supply the Western States, including California. This new pipeline will reduce the amount of domestic natural gas available to California.

One of the main justifications made by LNG companies, including Sempra, for bringing LNG to California is a claimed imminent, chronic shortage of North American natural gas. Despite this feigned "shortage," Sempra is clearly investing heavily in North American natural gas, as long as it is diverted away from Southern California, where it would compete with its *Costa Azul* LNG import terminal. By sending Rocky Mountain gas eastward, Sempra is guaranteeing a captive market for imported, expensive LNG with the Sempra-owned utilities.

Cabrillo LNG Rejected on Grounds of Questionable Need

In April 2007, the California State Lands Commission and the California Coastal Commission both rejected a proposal by BHP Billiton to build the Cabrillo Port LNG terminal off the coast of Oxnard. Among the reasons given for a "no" vote by State Lands Commissioner and Lieutenant Governor John Garamendi was the unproven need for the project. In his decision he stated, "The Environmental Impact Review demonstrates a glaring lack of consideration given to the use of alternative energy sources, and it relies in part on what appear to be outdated statistics. Most disturbing, the proponents were unable to present a persuasive case as to the actual need for the Cabrillo Port proposal."

Fellow Commissioner and State Controller John Chiang emphasized the emissions impact of the project, saying, "We all know the Governor and the Legislature have enacted statutes to reduce California's carbon footprint and move us away from fossils fuels toward cleaner, renewable alternatives. I do not think this project is something that carries out the promise of our new, groundbreaking laws."

While these decisions apply to one project in California, these concerns of unproven need and emissions impacts are applicable to all LNG terminals proposed for the West Coast.

LNG: Unpredictable and Unreliable

LNG will place the Pacific Coast energy grid and ratepayers' energy bills at the mercy of global politics and international instability. Environmental and human rights abuses associated with natural gas production in Indonesia, Russia, and Peru have led to widespread discontent in the areas around the projects. These conditions could lead to, and have led to, projects being shut down, interrupted, or taken over by the host governments.

For example, discontent over LNG exports in Bolivia resulted in the toppling of the government. In 2005, a new president, Evo Morales, was elected; he is dedicated to nationalizing natural gas and prioritizing its use for in-country needs. Once considered a huge potential source of LNG, Bolivia is no longer considered an export market. In September 2006, the Russian government threatened to suspend construction of the Sakhalin II project, citing egregious violations of environmental law. Subsequently, the government leveraged a deal for Gazprom, a state-owned company, to take a controlling share of the project. The same month, the government of Indonesia announced it was cutting exports to Japan by 50 percent, because the natural gas was needed domestically.[66]

On the receiving end, if an accident or an attack shuts down an LNG import terminal, gas supplies would be stopped until the facility was rebuilt. LNG concentrates supply through a single import point, heightening the impact of a supply interruption and increasing the risk of brown-outs or black-outs.

The Rhetoric and the Realities of California's Energy Policy

Governor Arnold Schwarzenegger

Rhetoric: Acknowledges the reality of global warming, champions legislation to reduce greenhouse gas emissions.

Reality: Supports LNG imports, which will emit tens of millions of tons of greenhouse gases per year.

California Public Utilities Commission

Rhetoric: Will only procure energy from sources as clean or cleaner than a state-of-the-art natural gas power plant.

Reality: Facilitating LNG contracts with utilities by passing favorable regulations. The lifecycle emissions from LNG will add millions of extra tons of greenhouse gases for a natural gas power plant.

PG&E

Rhetoric: Mounts a high-profile "Let's Green This City" campaign in San Francisco, touting clean energy, conservation, and a green lifestyle. Called on President Bush to enact laws to reduce greenhouse gases.

Reality: Has fallen behind in meeting renewable and energy efficiency targets mandated by the state. Is investing in an LNG project in Oregon that will mostly serve California. The 223-mile-long *Pacific Connector* will cut through forests and watersheds in Southern Oregon to connect California to an LNG terminal in Coos Bay, Oregon.

Sempra

Rhetoric: Affiliate utility, San Diego Gas and Electric, launches a "citizens group" called *Californians for Clean and Reliable Energy*. Promotes proposed Sunrise Powerlink transmission project with images of windmills and promises of clean energy.

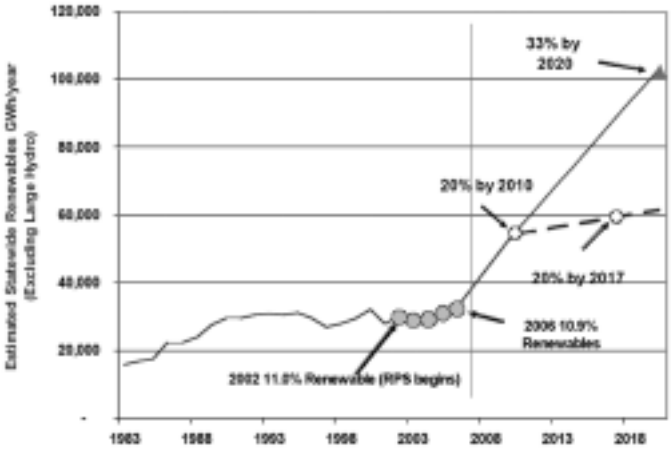
Reality: *The Sunrise Powerlink*, if approved, will move power mostly derived from fossil fuels, including LNG from the Costa Azul terminal. The transmission lines will go through the heart of Anza-Borrego State Park.

Bureaucracies Streamline LNG, Tie Renewables in Red Tape

Despite the many clean energy initiatives in California, the renewable energy industry is floundering in the state. According to a 2006 San Francisco Chronicle investigative report, the dense bureaucracy of regulations and hurdles enforced by two state agencies, the California Public Utilities Commission and the California Energy Commission, slows renewable projects for years.[67] In fact, California has only increased its renewable portfolio by less than one percent since 2002, and PG&E's renewable portfolio has actually decreased from 12.4 percent in 2002 to 11.9 percent in 2005 (see Graph 10). This reduction of renewables happened despite overwhelming political support for renewables and ratepayers' direct contributions of well over $319 million for renewable development. FPL Energy, the world's largest wind power company, is investing $2 billion around the country in the next two years, none of which will be invested in California.[68]

Bureaucratic challenges led one company, PPM Energy, to develop a wind farm in Solano County without obtaining any state agency approvals, and thus no utility contracts before construction, betting that they could build it outside of the state's renewable portfolio standard process and still find customers. Their gamble paid off. The company is now selling half of its energy to PG&E and the other half to municipal customers. "We like to say this project was built in spite of the Renewable Portfolio Standard, not because of it," said Jim Caldwell, PPM Energy's director of regulatory affairs. This stands in stark comparison to the ease with which Sempra was able to gain CPUC approval for California utilities to purchase natural gas from their planned LNG terminal in Mexico, facilitating that project's construction (see page 24).

Graph 10: Estimated Statewide Total Eligible Renewables GWh/year
(Excluding Large Hydro)



Source: California Energy Commission, Gross System Power 1998-3005[219]

Graph 10 demonstrates that renewable development must grow rapidly in order for utilities to comply with the law.

The Revolving Door Between California's Agencies and the LNG Industry

The counterintuitive actions taken by decision makers could be attributed to the extensive and disturbing ties that exist between the LNG industry and public officials. The governor's office, the CPUC, and the California Energy Commission are all guilty of cross-pollination, creating a revolving door between public office and major energy companies.

The public relations firm that ran the 2004 recall campaign that led to Schwarzenegger's governorship, Navigators DC, now represents the LNG industry in California. The firm set up an LNG advocacy organization, Californians for Clean, Affordable Safe Energy (Cal-CASE), which has embarked on a campaign to promote LNG and to confuse it with the domestic natural gas that is common in California. (The name of Cal-CASE is similar to that of a citizens' coalition that opposes LNG, Ratepayers for Affordable Clean Energy (RACE). RACE can be found on the web at www.raceforcleanenergy.org.)

There is also a "revolving door" between government and industry. The clearest example of this is the hiring of Joe Desmond by the LNG operating company Northern Star in November 2006. This occurred only ten days after Desmond resigned as the chairman of the California Energy Commission, an agency tasked with permitting new energy facilities in the state – especially natural gas power plants.[70] Steve Larson, the former executive director of the California Public Utilities Commission, the regulatory body that approves energy supply contracts and customer rates for electric and gas utility companies, resigned to take a leadership role at Woodside Energy, an LNG company with an active proposal to build an LNG receiving facility off Santa Monica Bay in Southern California.[71] Dave Maul, former natural gas analyst at the California Energy Commission, is now a consultant to Esperanza Energy, which has proposed a terminal offshore of Long Beach.

Policy Recommendations to Keep California's Clean Energy Promise

In order to prevent new foreign fossil fuels from derailing California's commitment to reduce conventional air pollutants as well as greenhouse gas emissions, the state must reject proposals to import LNG. Instead, the state must invest resources to implement clean energy initiatives and create policies within the state's energy agencies that truly favor clean energy development over fossil fuel interests.

California Must Say No to LNG

To follow the letter and spirit of the current clean energy laws, California must reject all new fossil fuel projects in favor of efficiency and renewables. With the proper investments, California can, in the long run, get most, if not all, of its power from non-emitting sources such as geothermal, biomass, ocean waves, water current, wind, and solar power. Such a transition would allow California to grow its economy while using energy more efficiently. In the meantime, the least dirty fossil fuel, and one that the state is already dependent on, is domestically produced natural gas. California can and should meet its natural gas needs with North American natural gas, while aggressively continuing to drive down its usage over time.

While North American natural gas is the "best of the worst" of fossil fuels, it is important to note that its extraction has had dire environmental impacts on the American West: it is a greenhouse gas, and, like natural gas all over the world, it is a finite resource.

California's closely intertwined electric and natural gas sectors can meet their legal greenhouse gas reduction requirements with the following policies:

- Suspend all permitting of LNG terminals and all utility contracts with LNG providers, both in and out of state. LNG imports will increase California's use of natural gas and greenhouse gas emissions. Importing it will likely reverse the current trend of shrinking demand for natural gas.
- Deny further utility contracts to purchase power from coal-fired generation in the Western States unless plants reduce carbon dioxide emissions to a level less than the most efficient natural gas plants, require no new major transmission facilities, and meet the highest standards for other emissions.
- AB32 and other laws intended to curb greenhouse gas emissions must account for the lifecycle emissions of any energy source. For LNG, this means all of the emissions that occur in the production, processing, and transportation of the fuel, including emissions outside California.
- Strengthen and create comprehensive government initiatives that reward individuals for implementing energy-saving tools in their homes and businesses, like zero energy/zero net carbon buildings that incorporate geothermal, solar, efficiency, tree-shading, and other measures.
- Legislate and fully implement the proposed 33 percent Renewable Portfolio Standard and aggressively remove red-tape barriers to renewable projects in California.
- Move to a more sound method for financing renewables than the currently flawed Supplemental Energy Payments (SEP) system, such as generous production tax credits, the successful European Feed-in Tariffs system, and use of public low interest or zero interest bonds.
- Following the example of Texas law, forbid corporate campaign contributions by energy companies, cap lobbying money that energy companies are allowed to spend, and limit how they can spend it. Strengthen conflict-of-interest provisions for public servants to close the revolving door that allows private interests to run public processes. Effective enforcement of clean energy laws depends on removing the dominance of the fossil fuel and investor-owned utilities over the state's lawmakers and state agencies.

The One Percent Solution

The cost of inaction on global warming will be immense, and the cost of reducing greenhouse gas emissions is very low in comparison. In California, this translates to a modest investment for a return of far fewer greenhouse gas emissions.

According to a recent report prepared for the United Kingdom's Treasury Department by former World Bank economist Sir Nicholas Stern, continued global warming could shrink the future global economy by 5 to 20 percent. Yet Stern concludes that *the world's economies can avoid this economic calamity by dedicating only one percent of their gross domestic product to reducing greenhouse gas emissions*.[72] California should invest an equivalent amount to clean energy development as well as energy efficiency measures.

California's gross annual product in 2005 was $1.622 trillion;[73] one percent of this would amount to an expenditure of $16 billion per year toward reducing carbon emissions. This amount should gradually escalate as the economy grows. This figure is at the high end of a recent estimate of the cost of meeting California's goal to reduce carbon emissions 80 percent by 2050, according to the Electric Power Research Institute (EPRI). The estimates ranged from $100 billion to $500 billion out of a cumulative state economic output of $43,709 billion over the next 42 years, with all figures discounted to present value to adjust for inflation through 2050. While adding up expenditures through 2050 has great shock value, this astounding reduction in carbon would be achieved by only spending between 0.2% and 1.2% of economic output.

The EPRI report specifically *did not consider any economic benefits that might come from climate protection*. "The report should in no way be perceived as a cost-benefit analysis of California climate policy. The focus is exclusively on the nature and costs of various abatement strategies required to achieve the state's GHG emission targets. No attempt has been made to assess the global or California damages avoided as a result of California climate policies." [74]

Investing in Clean Energy Avoiding global climate damage is only one benefit of reducing carbon emissions. Local economies also experience growth due to manufacturing clean energy technology and construction of clean energy facilities. While renewable energy creates more jobs than fossil fuels, imported fossil fuels contribute to the growing foreign trade debt, sending dollars and jobs overseas. Thus, when all the economic and environmental benefits are counted, the one percent of money spent on domestic clean energy resources becomes an investment rather than an expense.

Electricity generation accounts for 20 percent of carbon emissions in California. The appropriate one percent investment share for electric generation expenditures (20 percent) would be $3.2 billion per

Table 3: Projected Major Annual Clean Energy Expenditures in California

Program	Annual Public Funding
33% Renewable Portfolio by 2020	$220,000,000
California Solar Initiative (2007 to 2017)	$300,000,000
CPUC Energy Efficiency (from 2008)	$800,000,000
Municipal Utility Energy Efficiency	$77,000,000
Low Income Energy Efficiency	$100,000,000
Annual Listed Programs	$1,497,000,000

year (or 0.2 percent of the state's gross annual product.) The state currently has $1.5 billion in annual program and utility funds dedicated to clean energy, as detailed in Table 3 on page 31, or just under 50 percent of the amount prescribed by Stern. Of course, not all of this money needs to come from government sources, since public funds are often best used as an incentive to drive a larger private investment. Table 3 summarizes expected program commitments for just the electric sector.

The amounts listed in Table 3 represent the subsidies. For most programs, these funds are designed to stimulate further private investment. For example, the money spent on the California Solar Initiative will contribute an average of about $1 per installed watt of energy generating capacity over the life of the program.[80] Yet, the total unit cost of an actual photovoltaic system can range from $5 to $10 per watt. In this way the subsidy acts as a lever to spark private investment much larger than the subsidy itself.

Investing in Energy Efficiency Central to the Governor's plan to achieve the state's greenhouse gas reduction goals, in addition to the renewable requirements, is a commitment of nearly $1 billion per year toward improving energy efficiency. According to the California Energy Commission's 2005 Energy Policy Report:

"The *2003 Energy Report* concluded that 30,000 additional GWh represent the maximum achievable electricity savings from energy efficiency programs over the coming decade. The CPUC adopted aggressive energy savings goals in 2004 to reach this potential. When these goals are met, energy savings will represent more than half of Invester Owned Utility (IOU) need for additional electricity between 2004 and 2013. To achieve these goals, the CPUC significantly increased IOU energy efficiency funding to $823 million for 2004-2005 and $1.98 billion for 2006-2008." [81]

The list in Table 3 is not exhaustive but does show that California, in the electric sector alone, has already committed to spending a significant portion of the necessary total annual funds suggested by the Stern Report and EPRI for the purpose of carbon reduction. Of course, this assumes the state carries through on its policies and actually achieves the targets. Several threats loom, including locking in the 33 percent renewable target (the most significant challenge), clearing regulatory hurdles, and making sure that clean energy wins out over the competition for market share and capital allocation.

Conclusion

This report finds that LNG's high lifecycle greenhouse gas emissions, severe environmental impacts, and staggering investment costs are at odds with California's commitment to clean energy. Importing LNG will derail California's renewable energy program, commit the state to a new foreign fossil fuel for decades, and increase greenhouse gas emissions in the state and around the world. California must reject LNG and instead support investment of resources to implement clean energy initiatives and create policies within the state's energy agencies that truly favor clean energy development over fossil fuel interests.

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Pacific Environment protects the living environment of the Pacific Rim by promoting grassroots activism, strengthening communities, and reforming international policies.

www.pacificenvironment.org

Pacific Environment coordinates the coalition Ratepayers for Affordable Clean Energy (RACE). RACE is a partnership of over 25 organizations working towards a clean energy future for the West Coast of North America. We envision that in the coming years, the West Coast's energy supply will be increasingly clean, efficient, and affordable for all. RACE works to develop progressive energy policies, supports grassroots campaigns, analyzes state and local energy policies, and works to influence lawmakers to make the best choices on energy issues.

www.raceforcleanenergy.org

RACE's partners include:

Amazon Watch

Border Power Plant Working Group

California Alternative Energies Corporation

Californians for Renewable Energy - CARE

Central Coast Alliance United for a Sustainable Economy (CAUSE)

Center for Biological Diversity

Citizens Against LNG (Coos Bay)

Coalition for a Safe Environment

Energy Options

Environment California

Environmental Protection Information Center (EPIC)

Friends of Living Oregon Waters (FLOW)

Green Guerrillas Against Greenwash

Greenpeace

Local Power

Long Beach Citizens for Utility Reform

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No LNG Community Alliance (Oxnard)

Northcoast Environmental Center

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Public Citizen

Rivervision

Saviers Road Design Team

Stewards of the Earth

Vallejo Community Planned Renewal (VCPR)

Ventura LNG Task Force

Wildcoast

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