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# CABRILLO PORT: A new source for clean, reliable energy...

California recently experienced an energy crisis of such severity that it literally left hundreds of thousands of homes and businesses in the dark as waves of electricity "blackouts" swept the state. At the same time, a drastic rise in import costs sent consumer prices through the roof.

Californians again were hit hard when gasoline prices skyrocketed, underscoring the potentially drastic impacts of California's vulnerability to the oil market. More recently, Californians suffered as the cost of natural gas coming into the state reached historic highs.

## A Natural Gas Crisis in California... And the Nation?

National energy and economic experts have raised concerns about the available supply of natural gas nationwide. In fact, Federal Reserve Chairman Alan Greenspan recently told a congressional committee that the United States should enhance its ability to import liquefied natural gas from other countries in order to address tight supplies and create a "safety valve" that can help stabilize natural gas prices.

Here in California, we use more energy than any other state in the U.S., except Texas. We are the leading consumer of natural gas -- expending it at the rate of over 6 billion cubic feet per day. One-third of all the electricity used in the state is generated by natural gas, a figure that is projected to rise to nearly 40% by

2009, according to the California Energy Commission.

Natural gas is a preferred fuel source because it is the cleanest burning fossil fuel -- far more so than coal or oil, which account for more than 60% of U.S. energy consumption. In California, the substitution of natural gas for petroleum in fuel-intensive industrial and commercial operations and in electricity generation has been of significant benefit in efforts to reduce harmful emissions and improve air quality.

And natural gas is economical, typically costing far less than electricity for home uses.

## Securing a Reliable Supply of Natural Gas

Worldwide, natural gas is in plentiful supply; however, the United States holds less than 4% of total world reserves, and California produces less

than 15% of the natural gas used within the state.

Prospects for the near future are not much better: As California's demand for electricity continues to grow, so does our need for natural gas. In the last few years, over a dozen new electric generation facilities have been approved by California authorities -- all of which use natural gas. And, in an effort to meet the projected increase in future demand, there are more than a dozen new gas-fired electric generation projects awaiting approval. Our demand for natural gas is rapidly outpacing our available supply.

Until recently, California was able to rely heavily on other states and Canada for natural gas imports, but it is no longer quite so simple. Gas demand is growing across the nation, too, and other states need more natural gas. The U.S. Department of

### California Gas Demand

California – Natural Gas 2001		
	Million Cu. Feet	Percent of National Total
<b>Local Production</b> 	366,764	1.86
<b>Consumption</b>		
<b>Residential</b> 	512,695	10.73
<b>Commercial</b> 	245,795	8.09
<b>Industrial</b> 	666,462	9.05
<b>Vehicle Fuel*</b> 	2,312	18.77
<b>Electric Power</b> 	976,912	18.47
<b>Total consumption</b>	<b>2,404,176</b>	<b>11.74</b>

\* Year 2000 data taken from California Energy Commission Report      Source: American Gas Association



**Cabrillo Port will be approximately 21 miles offshore from the City of Port Hueneme. The pipeline will come to shore to connect with the existing Southern California Gas Company pipeline system.**

Energy projects that by 2020 Americans will consume 62% more natural gas than they do today, and that at least 9 out of 10 new electric generating plants will be fired by natural gas.

California's options for natural gas are increasingly uncertain.

In order to ensure the availability of natural gas for our homes, as well as to fuel industry and commerce, we must secure a more diverse, more reliable supply of natural gas. This would make it possible to better control costs and use our energy resources in a more cost-effective and environmentally sound manner.

## Cabrillo Port

BHP Billiton, the world's largest diversified natural resources company, is seeking approval to construct and operate the Cabrillo Deepwater Port, a Floating Storage and Re-gasification Unit (FSRU) off the California coast, approximately 21 miles offshore of Port Hueneme. This deepwater "port" would be the receiving point for shipments of

Liquefied Natural Gas (LNG) from carrier ships that routinely cross the world's oceans and deliver to LNG facilities in North America, Asia and Europe.

LNG is simply the liquid form of natural gas. A process called liquefaction makes it possible to alter the natural gas so that it can be transported as a liquid by ship or truck.

On Cabrillo Port, this "California-bound" LNG would be restored to natural gas via the re-gasification process, which warms it to a point where it becomes natural gas again for delivery into the existing natural gas pipelines of Southern California Gas Company.

Cabrillo Port would be permanently moored offshore, well outside the existing shipping lanes, far from a sensitive marine sanctuary, and set apart from any marine mammal migratory patterns. The offshore location minimizes both environmental impact and risk by providing for protection from coastal development, heightened security advantage, and diminishment of risk to society.

Cabrillo Port is a floating offshore vessel, similar in shape and general design to an ocean-going ship, measuring 938 feet by 213 feet. Cabrillo Port houses three spherical storage tanks into which the LNG is pumped from delivering carriers. These storage tanks incorporate the most widely used technology for LNG storage and are considered an industry standard. Each tank has a storage capacity of 41,678 tons of liquid, or the equivalent of about 2 billion cubic feet of natural gas, for a total equivalent of 6 billion cubic feet of natural gas.

Eight vaporizers on the vessel will allow for the re-gasification of up to 1.5 billion cubic feet of natural gas per day. However, normal output will be approximately 800 million cubic feet of natural gas per day -- about 13% of California's average daily natural gas consumption.

LNG fuels the operation of the off-loading carriers and Cabrillo Port itself, and the re-gasification process is entirely self-contained. Unlike some cooling or heating processes, the re-gasification process generates fresh water which is consumed onboard, eliminating the use of sea water and protecting against any impacts to marine life or the environment.

After the LNG is converted to natural gas, the gas will be transported via an underwater pipeline to the shore. The pipeline will be buried as it nears the shore and emerge at a Southern California Gas Company connection in Ventura County. The natural gas will be directed to the existing natural gas pipeline system of the Gas Company for distribution through their pipelines. No extensive onshore facilities will need to be constructed to operate this project.

## State-of-the-Art Technology

For decades, floating production and storage systems have been used successfully around the world, and BHP Billiton is a leader in the



installation and operation of floating offshore facilities. The idea and the technology for floating LNG re-gasification facilities is not new: studies go back nearly 30 years, and the structural and technological components for these floating facilities have been in use for decades. BHP Billiton is proposing an innovative, state-of-the-art solution that takes advantage of the best available technology for offshore transfer. Its design has been reviewed by the leading classification, certification, and safety consulting firm for the LNG industry (Det Norske Veritas), and it has been found to meet both operational and safety standards.

## LNG is the Transportation Solution to Supplying Natural Gas

The process to liquefy natural gas into LNG was developed to address the need to transport large quantities of natural gas across oceans and to other continents. As a liquid, LNG has substantially less volume than natural gas. One carrier load of LNG is equivalent to 600 times the volume of natural gas shipped via pipeline.

- To create LNG, natural gas is cooled until it condenses into a liquid form.
- Cooling the gas to a liquid occurs at minus 260 degrees Fahrenheit, reducing its size tremendously to just 1/600th of its gaseous volume.
- During the cooling process, the gas is also purified, virtually eliminating such compounds as nitrogen, carbon dioxide, hydrogen sulfides and other impurities, which enhances its clean-burning properties.
- LNG is a clean and safe energy that is far less dangerous than gasoline, propane or butane, all of which are commonly used fuels.



### Cabrillo Port's Floating Storage and Re-gasification Unit will be the receiving point for LNG shipments.

- Once it reaches its destination, LNG can be turned back into natural gas through re-gasification which warms it, at which point it becomes natural gas again and can be distributed through natural gas pipeline systems.

In parts of the U.S., storing LNG, then converting it back to natural gas, makes it possible to prepare in advance for temperature spikes in the winter and summer, when there is greater demand for fuel for heating or cooling.

Worldwide, the LNG transport market continues to grow. Currently, there are 64 LNG liquefaction facilities producing LNG for carrier transport to LNG re-gasification facilities in 11 countries. In the United States, there are 113 LNG facilities in operation nationwide.

### Storage and Transport of LNG

Today, all LNG carriers are designed with double hulls. This containment system consists of a primary tank made of alloys of stainless steel, nickel or aluminum and a secondary containment system made of similar materials. In the unlikely event of a leak in the primary tank, the secondary containment system prevents LNG from reaching the inboard surfaces of the vessel's

double hull. This double containment system is well insulated to keep the LNG cold and in its liquid state.

At the receiving point, LNG is re-gasified. The LNG is first pumped from the containment system through a heat exchange system, which converts it back to its gaseous form. The former LNG, now natural gas again, can then be transported by pipeline just like other natural gas.

### The LNG Safety Record

As a form of energy, LNG is subject to the same level of regulation as any other fuel, which means it must meet rigorous safety standards. Offshore, the United States Coast Guard (USCG) monitors safety at LNG terminals and carrier ships in U.S. Coastal Waters. The Department of Transportation (DOT) regulates LNG tanker truck operations, and the U.S. Federal Energy Regulatory Commission (FERC) reviews and permits onshore LNG terminals. All of these agencies conduct thorough inspections, as well as continuous oversight of those facilities. In addition, the U.S. Environmental Protection Agency (EPA) and state environmental agencies establish air and water standards for the LNG industry.

LNG has been safely handled for many years. New technology has put in place even more measures to ensure safety both onshore and

offshore. Over the past 40 years, with worldwide transport of some 120 million metric tons of LNG each year -- covering a distance of more than 60 million miles -- there have been few safety incidents. This is due, in large part, to the rigorous training and certification requirements for officers and crews operating LNG carriers, which are considered far more stringent than for any other class of commercial shipping. Extensive safety equipment that is standard on LNG carriers, including sophisticated radar and positioning systems, as well as highly sensitive, computerized monitoring also contributes to this safety record. In fact, according to a report by the U.S. Department of Energy, only eight marine incidents worldwide have involved spillage of LNG, with none involving cargo fire. Seven other incidents involved damage, but no spillage. There have been no fatalities on LNG carriers.

An accident attributable to LNG at an onshore facility in the U.S. occurred in 1944, resulting in strengthening of industry-wide design codes for LNG facilities. Since then, onshore LNG facilities have had an admirable safety record.

LNG itself does not burn. When LNG is warmed up and turned back into natural gas it is flammable within a very limited range. If the mixture of natural gas with air contains less than 5% natural gas, it cannot burn because it is too lean. If the mixture of natural gas with air contains more than 15% natural gas, it cannot burn because it is too rich.

## Environmental Review & Community Participation

Cabrillo Port will be approved only through a lengthy process of environmental review, public hearings and consideration by numerous federal, state and local jurisdictions.

The USCG is the primary federal agency with oversight authority for preparation of a thorough

Environmental Impact Statement (EIS). The EIS will examine the potential impact of the project, both offshore and onshore, with respect to construction and operational safety, environmental issues, community issues, and other areas of interest.

Concurrent with the preparation of a federal EIS, the project must go through California environmental review under the jurisdiction of the California State Lands Commission, as well as permitting review from several other agencies and jurisdictions.

Ongoing operation of Cabrillo Port will be subject to additional oversight: The USCG will continue oversight and inspection for the life of Cabrillo Port, and the U.S. Department of Energy (DOE) reviews and permits LNG imports and conducts thorough inspections. In addition, the EPA and state environmental agencies establish air and water standards for the LNG industry.

Importantly, in addition to the public hearings mandated by the environmental review process and those scheduled by local jurisdictions, BHP Billiton is committed to regularly communicating with the local community and answering questions about Cabrillo Port.

To establish a point of entry for a new supply of energy will be of major importance to California. BHP Billiton believes this project can be a model for the U.S., and is looking forward to receiving comments and suggestions on how Cabrillo Port can best work for California.

## About BHP Billiton

BHP Billiton is a leading natural resources company and a major



**LNG is transported around the world by carrier ship every day, delivering a vital energy resource to fuel households, power plants and scores of other users.**

supplier of minerals and energy products. Based in Melbourne, Australia, BHP Billiton is listed on the London and Australian stock exchanges and holds ADR listings on the New York Stock Exchange.

BHP Billiton is known as an environmentally responsible company and is committed to sustainable development. Health, safety, environment and community responsibilities are integral to the company's operations, and BHP Billiton works with local communities to create sustainable economic development. Additionally, the company is making significant efforts within its operations to minimize and reduce CO2 emissions.

The company actively develops environmental programs with a focus on establishing sustainable partnerships that foster community engagement and employee volunteerism. One example is a program with Conservation Volunteers Australia to protect and revitalize 100 of Australia's most important wetlands.

BHP Billiton's efforts to site and permit Cabrillo Port are part of its commitment to address energy issues in an environmentally responsible manner.

**For more information about Cabrillo Port, please telephone (805) 604-2785. Or, visit the Cabrillo Port website at [LNGsolutions.com](http://LNGsolutions.com).**

