Appendix H. Fuel Procurement Issues

H.1 Overview

This Appendix presents issues and strategies related to LADWP procurement of both natural gas and coal.

H.2 Natural Gas

LADWP generates about 30 percent of energy from natural gas-fired generation. Or, in other words, about one-third of LADWP's energy generation is exposed to the risks of gas price volatility. Figure H-1 below graphically illustrates the daily natural gas spot market price (including delivery charges to LADWP's gas plants) and the large price fluctuations from the year 2002 to 2006.

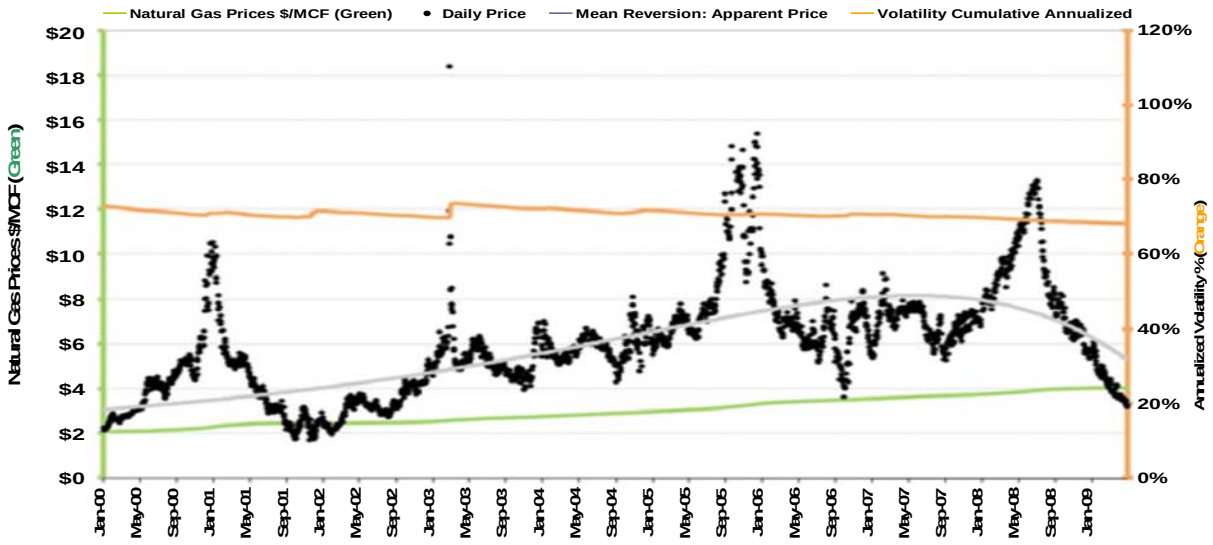

Figure H- 1: Natural Gas Daily Spot Prices

As is shown on Figure H-1, the natural gas market has been very volatile with extreme variations of prices. Since gas currently plays such an important role in LADWP's generation portfolio, it is paramount that the impact of gas price volatility to the resource plan be mitigated.

To minimize LADWP's exposure to natural gas price volatility, LADWP has implemented a variety of actions since the 2000 IRP, which include:

1. Created a financial risk management program to mitigate natural gas price spikes and a comprehensive gas procurement strategy to support renewable generation and long term financial goals

2. Established executive controls over energy risk management and natural gas hedging activities by creating an Executive Risk Policy Committee to provide clearance for all major hedging decisions.
3. LADWP obtained approval from the Los Angeles City Council to delegate its award authority to LADWP's General Manager for approving gas procurement contracts. LADWP also approved pro forma NAESB (North American Energy Standards Board) contracts for use in procuring natural gas.
4. LADWP has participated with SCPPA in purchasing an active gas reserve in the Pinedale anticline area of Wyoming. This reserve is currently producing approximately 8,100 million British thermal units (MMBtu)/day, of which LADWP receives approximately 83 percent of the project.
5. LADWP has also replaced approximately 1,100 megawatts (MW) of electrical generation with combined cycle technology. This technology is much more efficient in generating electricity than the generating units that were replaced, resulting in a 30 percent to 40 percent decreased usage of natural gas to generate the same amount of electricity.
6. As a result of implementing the greater use of renewable energy, LADWP's usage of coal will be reduced considerably. A general discussion on natural gas pricing issues is provided in the following subsections.

H.2.1 Natural Gas Pricing Issues

Gas delivered to the burnertip for electric generation in California is comprised of three elements: 1) commodity costs; 2) interstate transportation; and 3) intrastate transportation. Other concerns include regulatory/legal issues, gas price volatility, and gas supply issues.

Commodity Costs
Natural gas for electric generation is produced primarily outside California in areas known as basins, such as the Green River Basin near Opal, Wyoming; the San Juan Basin near San Juan, New Mexico; and the Permian Basin in west Texas. Gas produced from individual wells is gathered by small pipeline systems and delivered into a gas plant that processes the raw gas into pipeline quality gas for delivery to markets. Prior to the 1980s, this pipeline gas was sold as a bundled product by various interstate pipelines to distribution companies in the individual states, such as the Southern California Gas Company (SoCal) and the Pacific Gas & Electric Company (PG&E). Eventually interstate gas rates were restructured so that interstate pipelines became transport-only businesses with the gas marketing function spun off to the market via unregulated affiliates or independent marketers.

Intensified exploration in non-traditional producing areas of the country, chiefly the so called shale gas, has produced a surplus of gas, which has contained prices recently and will continue to do so in the foreseeable future. The development of Liquefied Natural Gas (LNG) import terminals in the United States has been delayed by a number of factors, including regulatory requirements, environmental issues, safety concerns, and economic uncertainty. Development of resources

known to exist in the United States offshore continental shelf, especially in view of the recent blowout of a deep underwater well near the coast of Louisiana, continues to experience similar issues.

Interstate Transportation

The interstate pipeline companies that formally sold bundled gas along with their transportation services have now focused primarily on the transportation of gas from producing basins to interconnections with the individual state's local distribution companies. The jurisdiction for the regulation of these companies falls under the authority of the Federal Energy Regulatory Commission (FERC). California is currently served by seven interstate pipelines although only four are actually directly connected to supply basins. The other three redistribute gas from other interstates. Volatility in gas prices into California has arisen because of various supply-related issues, variations in liquidity stemming from fewer suppliers in the aftermath of the market adjustment following 2000-2001, financial trading of commodities by funds, and weather-related events throughout the country. Limited price discovery has also added an element of uncertainty in gas transactions. California has become moderately over-piped since the Kern River 2003 Expansion was placed into service in May 2003. This condition predominated throughout the early 1990s. LADWP has terminated its firm Mojave pipeline capacity and its firm El Paso capacity. LADWP has firm capacity on the Kern River pipeline approximately equal to its forecasted average gas requirement although there is a certain amount of uncertainty in this forecast depending upon the degree of implementation of renewables.

Intrastate Transportation

SoCal is the sole provider of intrastate gas transportation services in Southern California. These services consist primarily of delivering gas from the interconnections with interstate pipelines near the California border, but also include storage, balancing, wheeling, parking, and loaning of gas. Ever since May 1988, SoCal has been relieved of its obligation to serve the so-called non-core customers, those who are able to make their own arrangements for procuring their own gas. All electric generators such as LADWP are deemed non-core or transport-only customers. The rate charged by SoCal for this transportation only service is regulated by the California Public Utilities Commission (CPUC). This rate is the lowest for any customer class (outside of any special negotiated rate) because it provides the minimum service and provides as close to cost-of-service pricing as possible. LADWP's active participation in SoCal's rate cases at the CPUC was instrumental in achieving this distinction.

Additional services relating to the delivery of gas are available from SoCal, but the rates are subject to negotiation and, usually, CPUC approval. Generally speaking, these services are of more value to marketers than to municipal generators, but in any case add to the cost of delivered gas.

One issue that has emerged from the recent price volatility in Southern California is whether or not SoCal has the ability to accept all the gas that will be filling the expanded interstates over the next few years. The CPUC has addressed this issue in a recent proceeding into the adequacy of SoCal's system to serve the expected load on its system. So far no conclusions can be made but SoCal is confident that they have the problem in hand because of their recent completion of various

system upgrades increasing takeaway capacity by approximately 11 percent. SoCal has been able to settle rate allocation issues to allow its intrastate transmission system to accomodate the delivery of LNG Gas supplies into its system.

Regulatory/Legal Issues

Several issues at the CPUC and FERC also impact pricing. SoCal revised its rates on October 2008 to accommodate the delivery of LNG into California, through the implementation of what is known as the Firm Access Rights (FAR) decision. Implementation of FAR has affected the role of transportation pricing and the distribution of receipt point allocations for deliveries into the California market. Another issue regarding the SoCal system, is the Wobbe Index. The Wobbe Index relates to the energy content of the natural gas delivered into SoCal's system which affects operating characteristics of gas turbines and emission levels. The Wobbe Index has risen to prominence due to environmental concerns which may substantially affect SoCal's service to electric generators. The CPUC has already allowed SoCal to set sufficiently high limits on the Wobbe Index for gas coming into its system. This will chiefly benefit LNG sourced gas although there is a challenge being mounted by the South Coast Air Quality Management District (SCAQMD). The SCAQMD has adopted a new rule, Rule 433, which proposes to monitor the effects of any increase in the Wobbe Index and could be interpreted as an attempt to regulate the distribution of natural gas. It is anticipated that the CPUC will oppose this initiative, and at this point in time, SoCal has filed a lawsuit to set aside Rule 433.

The FERC is presently preparing new tariff sheets for the Kern River pipeline in which LADWP has a substantial interest. Kern River had applied for a significant rate increase, but lost after a long proceeding at the FERC. The rate case was settled by most of the interested parties and refunds were distributed. Subsequently, one party that did not settle was able to halt the settlement pending further review by the FERC. The distribution of refunds stands until the FERC resolves the issue.

Gas Price Volatility

During the winter 2000-2001 gas prices were highly volatile. This was somewhat repeated in milder form briefly in early 2003 and the second half of 2005. For the most part, extreme volatility has subsided with prices remaining at substantially lower levels than in previous years due to the recession. Forward pricing indicates that gas prices will recover in a year or two. The industry has endeavored to reduce volatility through a massive effort of injecting gas into storage for winter use, thereby eliminating the perception of a huge overhang of expected gas purchases during the winter heating season. By the end of the storage season on October 31, 2008, reservoirs nationwide were filled to record levels including SoCal's system storage. The storage season for Calendar Year (CY) 2009 seems to be a repeat of the record injection season the year before with extremely high levels of injection and levels of inventory. It is expected that gas price volatility will be reduced for LADWP through a program of financial hedging and physical risk management, and in view of the gas industry's and government's reaction to the 2000-2001 pricing volatility, the problem should not be repeated again, or at least will not occur with the same degree of severity.

Gas Supply Issues

- New drilling techniques make it possible to extract natural gas from deep shale rock formations. The advances mean the United States has more abundant natural gas resources than previously believed. Gas advocates say it could significantly alter the future U.S. energy market.
- Horizontal drilling ($1.06-$1.34 /thousand cubic feet (Mcf)) vs.. vertical drilling ($1.71 Mcf): horizontal wells open up much larger area of the resource-bearing formation
- Hydraulic Fracturing (or fraccing): Injecting a mixture of water and sand at high pressure to create multiple fractures throughout the rock, liberating trapped gas
- Combination of the Horizontal drilling and fraccing
- With more drilling experience, U.S natural gas reserves are likely to rise dramatically in the next few years. At current level of demand, U.S. has about 90 years of proven and potential supply
- Preliminary estimates suggest that shale gas resources around the world could be equivalent to or even greater than current proven natural gas reserves

H.2.2 Natural Gas Procurement Strategy

LADWP retained the services of PriceWaterhouse Coopers (PwC) in 2003 to assess, validate, and verify LADWP's current gas procurement strategy. Their report assessed the current strategy, suggested changes and enhancements to that strategy, and prepared a preliminary plan and timetable for implementing the changes.

As a result of PwC's review of gas operations, LADWP decided to adopt a program of protecting its gas costs from price volatility through financial hedging. The appropriate authority was sought and received by the City Council to employ financial hedges for up to ten years and physical hedges for up to five years, and to limit spending for this effort to no more than $15 million per year.

In addition, an Executive Risk Policy Committee was formed with senior management as members to provide oversight over the energy risk management activities of LADWP, including natural gas. Several actions have taken place.

First, LADWP's Financial Services Organization (FSO) negotiated individual ISDA (International Swaps and Derivatives Association) agreements with potential counterparties for the swaps to hedge gas prices. Fiscal Year 03-04 was the first complete year for using financial hedging to cap gas prices over a portion of forecasted gas requirements.

Second, LADWP obtained approval of two ordinances from the Council authorizing the Board of Water and Power Commissioners to delegate its award authority to the General Manager for approving gas procurement contracts. Subsequently the Board approved two separate pro forma NAESB (North American Energy Standards Board) contracts for use in procuring natural gas for

up to one year, and for up to five years in duration. A number of the one-year NAESB agreements are now being used to buy gas. Five year strips of gas for physical risk management purposes were completed in late 2008 using the 5-Year NAESB authority. In addition, in mid 2009 the 5-Yr NAESB was used to obtain a strip of landfill gas which contributes to the LADWP's Renewable Portfolio Standard goal.

Third, LADWP participated through SCPPA in a Request for Proposal (RFP) process soliciting proposals for a term supply of natural gas for 30 years for up to an average of 27,500 MMBtu/Day. The agreements were negotiated but the deal was never completed because difficulties with the economy greatly reduced the anticipated discount offered under the prepay.

Fourth, LADWP has participated with the SCPPA in purchasing an active gas reserve in the Pinedale anticline area of Wyoming. Savings from this purchase have totaled approximately $48,000,000 for the four years of ownership. Further production is indicated by virtue of the fact that neighboring production has been approved for drilling on 10-acre spacing, up from the current 20-acre spacing, by the Wyoming Division of Oil, Gas and Conservation. Other production adjacent to the SCPPA properties has already shown promise although development depends upon a number of environmental challenges.

PwC noted that LADWP's previous gas procurement strategy was highly dependent on spot market purchases and lacked the flexibility necessary to appropriately manage the price risk involved in gas buying, trading, and transportation activities. They argued at the time that price risk was a critical issue because gas was playing an increasingly important role in LADWP's future due to increased reliance on natural gas-fired generation. (Note that the 2000 IRP had recommended repowering four natural gas-fired generating stations and adding six gas-fired simple cycle combustion turbines to make up for a sale of a portion of LADWP's interest in the coal-fired Mohave plant, to replace units that were over 40 years old, and to meet anticipated load growth). Additionally, the increased use of renewables, such as wind farms and solar projects, may require higher levels of reserve margins because of their intermittent nature, with the higher reserve margins being provided by gas-fired generation. Also, gas price volatility and constraints on the SoCal intrastate transportation system required LADWP to place more importance on gas supply management.

Implementation Actions

LADWP has adopted strategies to reduce exposure to daily gas price swings: by the use of monthly spot purchases, implementation of index based financial swaps, physical term purchases, and ownership of gas reserves. Monthly spot purchases lock in first of the month indexes and reducing the volumes subject to floating daily prices. The reserve acquisition will reduce overall costs through amortization of the purchase price for the reserve. Additional administrative procedures were put in place to further strengthen deal tracking and audit trails.

An important initiative was put into play to obtain delegated authority from the City Council to allow LADWP management to execute SoCal's Master Service Contracts. This contract allows the LADWP to take advantage of additional services offered by SoCal such as storage, parking, loaning and wheeling. The initiative was completed in early 2008.

Additional Actions To Be Considered

With respect to transportation and storage options, LADWP will need to evaluate its options in view of the aggressive schedule adopted by the Board of Commissioners in meeting its goals for implementation of renewable technologies for generation and elimination of coal-fired generation. The successful completion of both these goals will significantly impact the need for natural gas generation. To this end, LADWP has begun to develop standardized methods for evaluating capacity projects. Factors to consider in evaluating options including:

- Cost of being short gas supply
- The amount of fuel carried in inventory for emergencies
- The type of fuel carried in inventory for emergencies
- Cost of alternatives
- Demand Side Management (DSM)
- Spot power purchases
- Alternative generation costs
- Service interruptions
- Political and budget impacts
- Cost of being over-contracted for off-peak periods
- Cost of new capacity (initial capital and demand and charges)
- Value of excess capacity sold on short-term basis

These factors are applied to the contracting options that range from meeting baseload requirements to meeting peak requirements.

SoCal is LADWP's only available intrastate transportation supplier by virtue of its authorized franchise. Since SoCal provides 100 percent firm full requirements service, LADWP's transportation need is met. Storage is being developed by others. In the meantime, LADWP may participate in SoCal's auction to acquire an appropriate amount of inventory space, injection rights, and withdrawal capacity on a year to year basis. Storage is most effective contiguous to load centers. However, the most geologically effective sites in the greater Los Angeles area have already been developed by SoCal Storage service. Storage is primarily useful for minor load balancing and, to some extent, hedging. Given the robustness of SoCal's distribution system in particular, and the interstate transportation system in general, storage is not necessary for emergency backup supply for power generation.

H.2.3 Proposed Actions

LADWP proposes to take the following actions to provide additional flexibility in implementing its natural gas procurement strategy:

- Increase the long-term natural gas hedging price cap. LADWP's authority for purchasing financial swaps for long-term natural gas is currently limited to $10.00 per MMBtu.
- Increase the short-term physical natural gas purchase price cap. LADWP's authority for purchasing short-term natural gas is currently limited to a rolling twelve months at $20.00 per MMBtu.
- Obtain delegated authority to execute SoCal's Master Services Contracts (MSC) along with the attachments for ancillary services as soon as the new MSC is published by SoCal after approval of its 2009 BCAP Phase II settlement.
- Increase the term limitation for its short-term power purchases. LADWP's authority for purchasing short-term power is currently limited to a rolling twelve months from date of execution.
- Seek authority to enter into long-term power purchase hedging contracts. LADWP is currently not authorized to enter into such arrangements.

In summary, LADWP has attempted to mitigate the impacts of volatile natural gas supplies and prices by acquiring a natural gas field, utilizing financial hedging contracts, and repowering over 1000 MW of electrical generation with more efficient combined cycle technology.

H.2.4 Liquified Natural Gas

LADWP has been carefully monitoring for years the development of LNG throughout the country, and in particular the many projects aimed at California. Generally, LADWP has been supportive of the concept but has not taken an active role in any proposed project. LADWP supports making additional supplies available to the market in California for reliability and cost reasons. This will be especially true as more states implement environmental regulations that will limit the amount of electricity produced from coal resources and shift much of the energy production to natural gas.

Currently there are no active LNG projects in California though several have been planned. Environmental issues and price containment from non-conventional shale gas have made project development a challenge.

H.3 Coal Procurement Strategy for the Intermountain Generating Station

H.3.1 Intermountain Generating Station

The Intermountain Power Agency (IPA) owns the Intermountain Generating Station (IGS). LADWP receives part of the power from IGS under a power purchase agreement with IPA that currently runs through 2027. LADWP is additionally under contract with IPA to oversee the operations of IGS and is known in that role as the Operating Agent. One of LADWP's duties as the Operating Agent is to arrange for the procurement of coal or coal assets, including any transportation services needed to get the procured coal to IGS. All contracts for coal procurement or coal asset ownership are done under the name of IPA. Management approval for coal procurement or coal asset ownership is given by the Intermountain Power Project Coordinating Committee (IPPCC), which is made up of IGS power purchasers (including LADWP), and the IPA Board of Directors (which does not include LADWP). Future coal procurement and coal asset ownership and related strategic development are therefore, done at the discretion and approval of the IPPCC and IPA Board of Directors on behalf of the power purchasers and owners of IGS.

H.3.2 Coal Supply – A Role for the Operating Agent

In its role as Operating Agent, LADWP administers, on behalf of IPA, a diversified portfolio of coal supply contracts that should by design hedge IGS power purchasers against escalating coal prices. The portfolio contains a combination of long-term, mid-term, and short-term coal supply contracts, which are either market price-based, fixed price-based, or cost of production price-based.

H.3.3 Coal Portfolio

The current coal procurement portfolio mix is as follows:

Long-term fixed pricing (with contracts beyond 2011):	80 percent
Short-term market pricing (spot market purchases):	20 percent

In all, the Operating Agent procures about six million tons of coal per year for IGS based on current capacity factors. At present, IPA has in place coal contracts which can supply all of the coal needs of IGS through 2011, with a significant portion of the coal needs beginning 2012 also already in place.

Historically, the vast majority of coal procured for IGS has come from Utah sources. The procurement of coal in the near- and far-term will likely be done in a similar manner as described above, with the percentages of the pricing methodologies in the portfolio mix being determined with pricing and security of supply in mind. While Utah coal is expected to remain a key part of the IGS coal supply for the next 20 years, Utah sources of coal are diminishing. Thus, it is

prudent for to the Operating Agent (with IPPCC and IPA Board of Directors guidance and approval) to seek out sources from new Utah mines and from other Rocky Mountain states. For several years the Operating Agent has procured short-term contract coal from more than a half dozen sources in Colorado and Wyoming. This will have to be done to a greater extent in the future. Since travel time using IPA-owned unit-trains increases while traveling greater distances to the out-of-state sources, the Operating Agent has already made arrangements to lengthen IPA's unit-trains, obtain additional railcar capacity, and expand IPA's railcar operation and maintenance facility.

H.4 Alternative Fuels for Basin Generation

Although there will be ample supplies and delivery capacity for natural gas to power all Basin generation for the foreseeable future, there is some concern that that LADWP will become too dependent on a single fuel. As a consequence, a great deal of thought has been put into identifying potential backup supplies in the event of an emergency.

Among those considered are liquefied natural gas and ultra-low sulfur (CARB) diesel. Both fuels present unique storage, handling, operational, and/or environmental problems. Both are deemed too expensive to implement.

The greatest disaster that could possibly affect the LADWP's ability to generate electrical energy for native load would be a massive earthquake such as the Northridge Earthquake that afflicted Los Angeles in 1994. During that event, due to transmission line problems, the entire power system in Los Angeles was islanded by load dispatchers and all available basin generation was put on line. No power was brought in from the Pacific Intertie and no Palo Verde, Navajo, Mohave or Intermountain power was available. Natural gas demand for power increased by 200,000 MMBtu/Day and was provided by a minority supplier in a timely fashion. This situation persisted for over two weeks until field crews could repair damage to transmission lines. No power plants were damaged as a result of the quake, but some were temporarily taken off line until the situation stabilized. All generation was eventually brought on line within a few hours of the quake. If the quake were much more severe, damage to the power plants' turbines would have necessitated them to be taken off line. The gas delivery system, both SoCal's distribution system as well as the interstate transmission systems, were not harmed by the Northridge quake. Characteristically, gas pipelines are imbedded in sand-filled trenches that allow the pipes to move about when the earth shifts, thereby reducing the possibility of breaking. Major transmission lines bring gas from the East and cross the San Andreas Fault, which move all the time, but never cause delivery outages. Thus it would appear that the gas delivery infrastructure is more robust than the power plants that depend on it.

We can conclude from this that although it might seem desirable to maintain some type of backup supply of fuel for in-Basin power plants, the existing natural gas supply system is likely both adequate and reliable enough to withstand a major disruption event.