

Appendix F
Fuel Prices

1. APPENDIX F – FUEL PRICES

We were asked to investigate historic and future prices for electrical generation fuels in the Southwest. Costs for all fuels, except coal, have increased significantly over the last several years. Natural gas, once near half the price of oil, has moved dramatically upward, yet remains cheaper than oil. Coal prices, by comparison, have increased at less than the rate of inflation.

In terms of future fuel prices, we believe that natural gas prices (in real dollars) are likely to decline somewhat over the next several years (through 2010), but gradually rise thereafter, reaching our current peaks only after 2025. The forecasted decline for the period 2006-2010 in natural gas prices is based on the rate of decline of prices for that period existing currently in the NYMEX Henry Hub futures market. Coal prices, generally, on the other hand, are likely to increase gradually (in real dollars) from present time until 2025, but at a modest rate compared to that of natural gas.

Table F-1 — Electric Generation Fuel Price Forecast for AZ & NV

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2015 | 2020 | 2025 |
|-------------|------|------|------|------|------|------|------|------|
| Natural Gas | 9.30 | 7.98 | 7.02 | 6.36 | 5.85 | 6.45 | 7.12 | 7.86 |
| Coal | 1.24 | 1.26 | 1.28 | 1.31 | 1.34 | 1.48 | 1.63 | 1.80 |

Prices are in year 2006 dollars per million-Btu.

1.1 TASK AND METHODOLOGY

This task involved investigating historic and future prices for electrical generation fuels in the Southwest.

Work on this task proceeded by:

- Collecting historic prices for coal¹, natural gas and other fuels in the Southwest
- Reviewing forecasts and projections of fuel prices
- Developing possible fuel price forecasts

¹ Coal prices for purposes of this task do not include prices for the Black Mesa Mine coal presently used by the Mohave Generating Station.

1.2 HISTORIC PRICES

Costs for all fuels except coal have shown significant increases over the last several years. The table below summarizes costs for Arizona and Nevada since 1998. This data was based on EIA fuel costs for generation. Oil (petroleum liquids) is the most expensive fuel and has doubled in price over this period. Natural gas, once near half the price of oil, has moved dramatically upward but still is cheaper than oil. Coal prices, by comparison, have increased at less than the rate of inflation

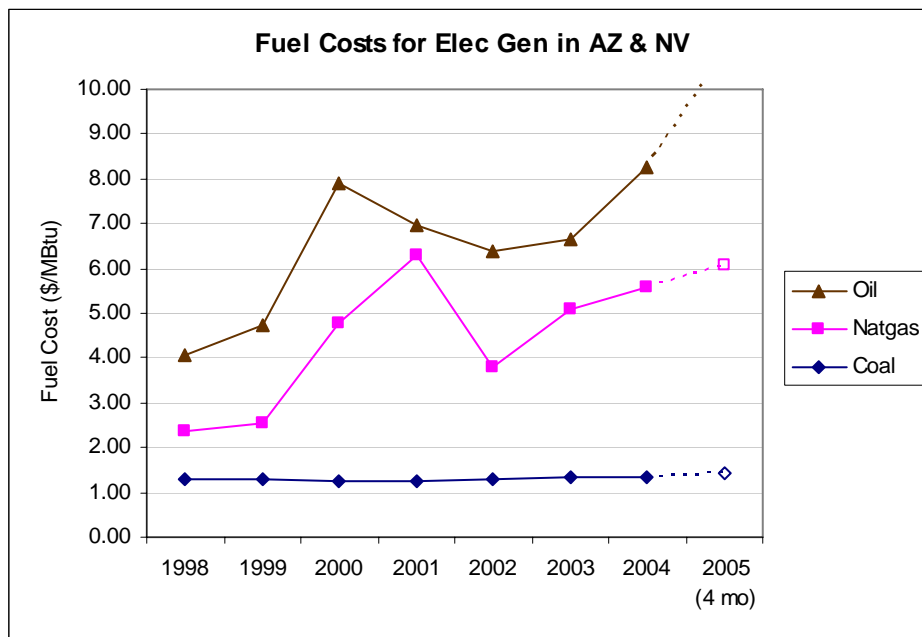
Table F-2 — Average Cost of Fuels Delivered for Electricity Generation in Arizona & Nevada

| Cost (nominal \$/Million Btu) | | Year | | | | | | |
|----------------------------------|-------|------|------|------|------|------|------|------|
| Fuel | State | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Coal | AZ | 1.33 | 1.33 | 1.24 | 1.25 | 1.25 | 1.26 | 1.29 |
| | NV | 1.30 | 1.29 | 1.26 | 1.26 | 1.34 | 1.39 | 1.35 |
| Coal Total | | 1.31 | 1.31 | 1.25 | 1.26 | 1.29 | 1.32 | 1.32 |
| NG | AZ | 2.39 | 2.64 | 4.78 | 4.60 | 3.20 | 5.04 | 5.71 |
| | NV | 2.30 | 2.42 | 4.75 | 8.03 | 4.38 | 5.11 | 5.48 |
| NG Total | | 2.35 | 2.53 | 4.76 | 6.31 | 3.79 | 5.08 | 5.60 |
| Oil ² | AZ | 4.29 | 4.98 | 8.60 | 8.11 | 6.73 | 7.92 | 9.30 |
| | NV | 3.80 | 4.53 | 7.22 | 5.85 | 6.00 | 5.42 | 7.22 |
| Oil Total | | 4.04 | 4.75 | 7.91 | 6.98 | 6.37 | 6.67 | 8.26 |

The figure below graphically represents this data and includes prices for the first four months of 2005. Here, again, there has been a steep rise in oil prices and a more modest one for natural gas prices.

² Petroleum liquids include distillate fuel oil, residual fuel oil, jet fuel, kerosene, and waste oil.

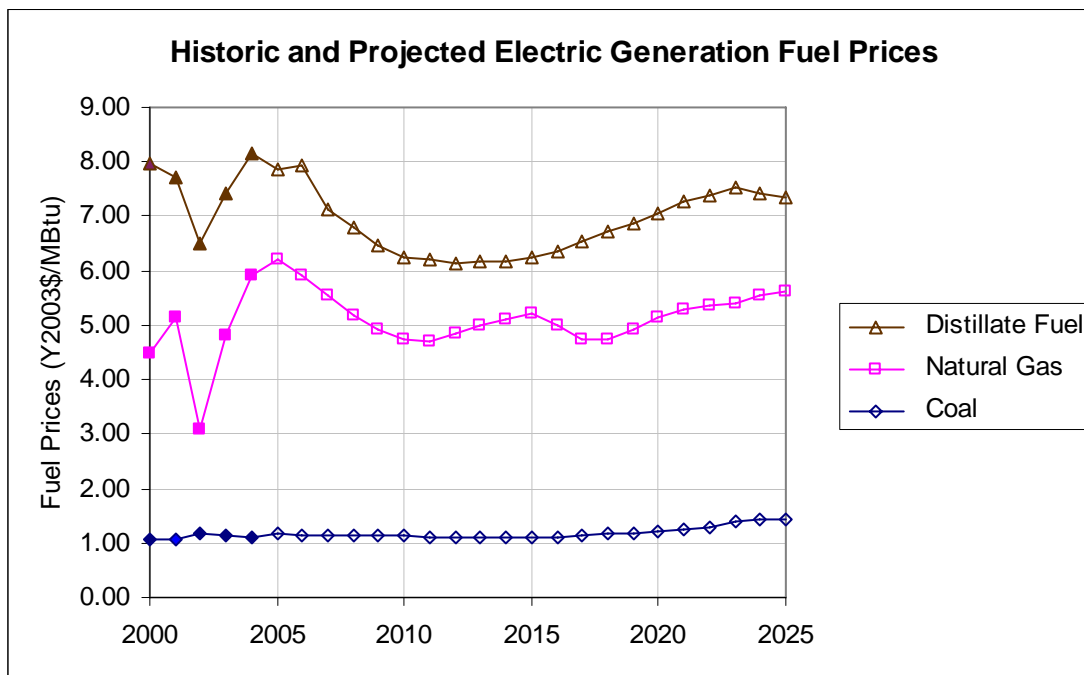
Figure F-1 — Historic Fuel Costs for Electric Generation in Arizona and Nevada



1.3 FUTURE PRICES

A starting point for considering future energy prices is the latest version of the Annual Energy Outlook (AEO) produced by the EIA. The most recent version, released in the spring of 2005 is AEO 2005, which was developed in the later part of 2004. The figure below shows the actual prices (in solid markers) through 2004 and the forecast (hollow markers) up through 2025.

Figure F-2 — Historic Prices and AEO 2005 Fuel Price Forecasts for the Region ³

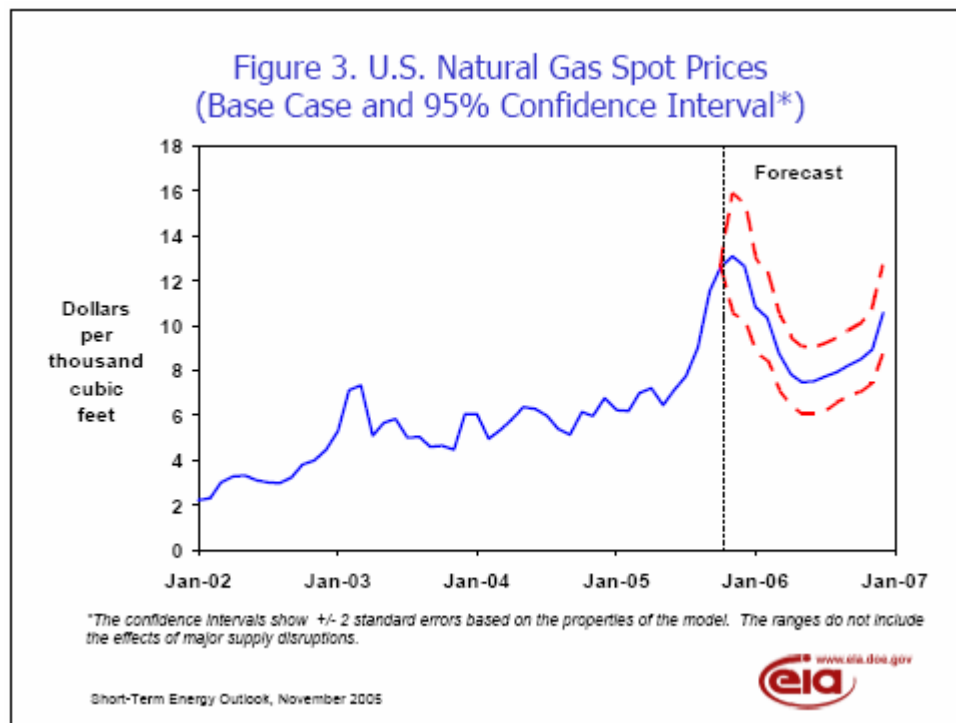


One basic feature of this forecast is the projected decline of oil and natural gas prices in real terms from their present values to moderately lower ones by 2010 and modest increases thereafter.

The following figure from EIA’s Short Term Energy Outlook (STEO) of November 8, 2005 shows that current natural gas spot prices are above the equivalent of \$12/Million Btu and predicts a steep decline to slightly above \$8/Million Btu in the Summer of 2006, but followed by a subsequent increase.

³ AOE 2005, Table 71. Electric Power Projections for Electricity Market Module Western Electricity Coordinating Council / Rocky Mountain Power Area and Arizona-New Mexico-Southern Nevada Power Area

Figure F-3 — EIA STEO Natural Gas Price Forecast



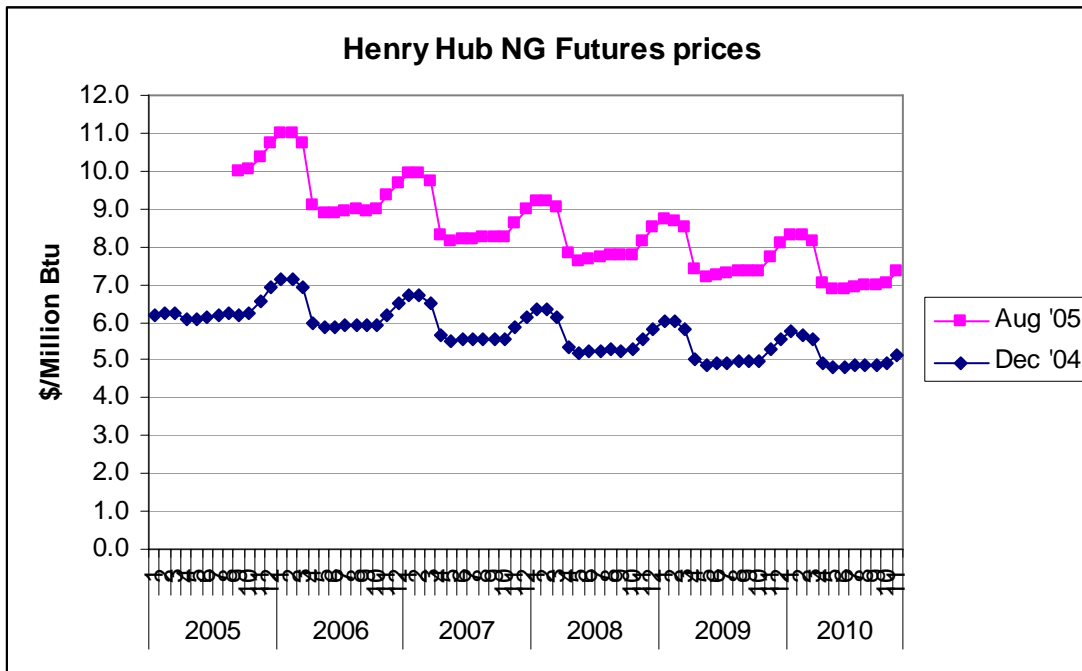
A further comparison can be performed using natural gas citygate prices from the STEO (Short-Term Energy Outlook) for the Mountain region. In 2004 they were \$5.63/thousand CF, in 2005 based on partial year data they are calculated to be \$7.06, and for 2006 they are forecasted to be \$8.19⁴. Converting to a Btu basis,⁵ those prices are respectively \$5.49, \$6.88 and \$7.88 per million Btu. The 2004 citygate price of \$5.49 is very close to the \$5.60 cost of natural gas in AZ & NV for electric generation given in Table 1. Thus, changes in citygate natural gas prices will likely be very closely matched by the prices paid by electric generators.

Further indications of the long-term increase in natural gas prices can be obtained from the NYMEX natural gas futures for Henry Hub. The graph below shows those prices for late 2004 when the AEO was being produced and much more recent prices from August 2005. Prices for 2006 are now about \$3 higher and even for 2010 they are still higher by about \$2 per million Btu

⁴ “EIA Short Term Energy Outlook”, Table 8c. U.S. Regional Natural Gas Prices: Medium Recovery Case, September 2005.

⁵ Average heat content for natural gas consumption is 1,026 Btu/CF, from EIA AEO Documentation Appendix H.

Figure F-4 — Natural Gas Futures Price Change from Dec 2004 to Aug 2005.



Given this recent price data, it seems that the AEO 2005 natural gas forecast should be adjusted upward to reflect these more recent markets. While it seems that some decline in the real price of natural gas is likely over the next few years, it also seems that that over the long-term, with depletion of natural gas resources and greater world competition for this fuel, prices will experience a gradual rise.⁶

While coal prices are not likely to increase to as great an extent, there are factors, such as the use of other fuels to mine and transport coal and overall increased demand, that will most likely cause a modest increase in real prices. A countervailing factor is that CO2 emission costs will reduce the relative cost of coal and thus may reduce the demand for and price of coal. However, our revised coal forecast is slightly above that of the AEO.

⁶ The specific methodology used for the intermediate term natural gas price forecast was to take the November 2005 STEO price and to apply a proportional adjustments based on the August & October NYMEX natural gas futures through 2010.

Figure F-5 — Revised Fuel Price Forecast for AZ & NV

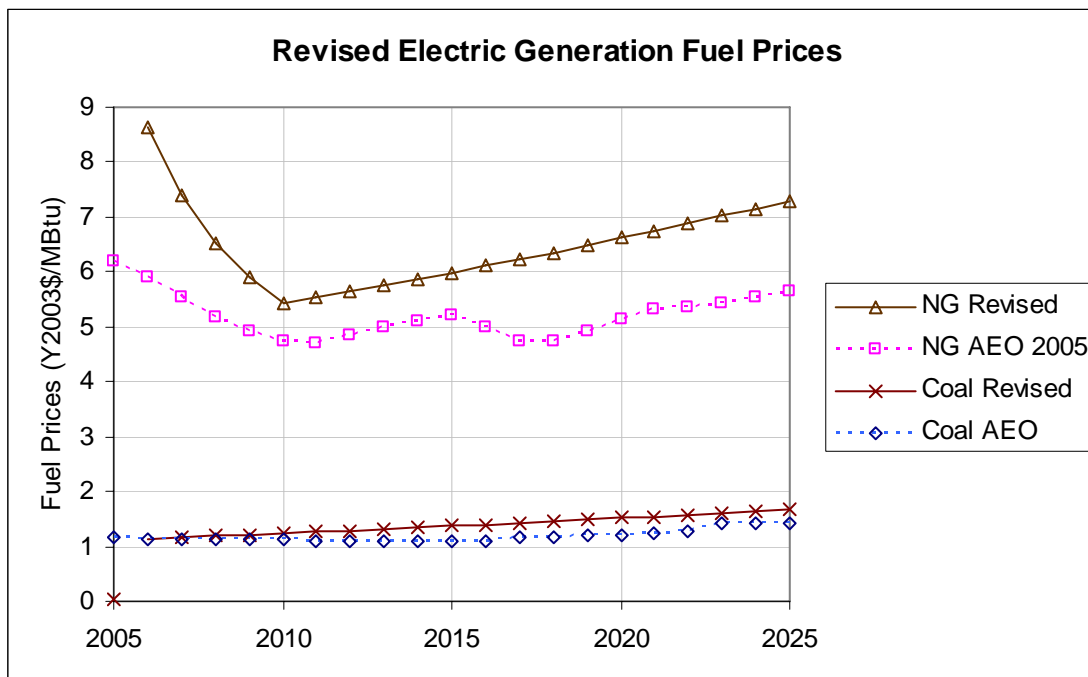


Table F-3 — Electric Generation Fuel Price Forecast for AZ & NV

| | <u>2006</u> | <u>2007</u> | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2015</u> | <u>2020</u> | <u>2025</u> |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Natural Gas | 9.30 | 7.98 | 7.02 | 6.36 | 5.85 | 6.45 | 7.12 | 7.86 |
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| Prices are in year 2006 dollars per million-Btu. | | | | | | | | |

To summarize, future natural gas and coal prices are likely to be above the AEO 2005 forecast. In view of the price sequence of Henry Hub natural gas futures prices, natural gas prices are likely to decline somewhat over the next several years, but then rise again. Coal prices are also likely to increase but at a modest rate.