Section 8: Summary

In this report the Energy Policy Office has updated and broadened its 2001 report *Convergence: Natural Gas and Electricity in Washington*. In the 2001 report we examined the rapid and large ongoing (and projected) increase in natural gas consumption by the power generation sector, and the potential consequences of these changes on gas usage and infrastructure. In this report we expanded our analysis and examined the entire natural gas market both regionally and nationally. We focused our efforts on the gas price volatility during 2000-2003, with emphasis on how regional and national supply, demand and infrastructure issues played into the gas price volatility. Our analysis leads us to conclude, as have many others, that the U.S. natural gas market has fundamentally changed over the last six years moving from a market with excess gas production capacity to one with a very tight balance between gas supply and demand. The topical highlights of the report are briefly summarized below:

Recent History

- Natural gas prices were low during the 1990s, generally around $2.5/MMBtu (wellhead price in 2002 dollars), which encouraged consumption.
- The 2000-01 West Coast energy crisis saw gas prices increase dramatically, reaching $17/MMBtu at the Sumas gas hub in January 2001.
- Regional and national prices dropped to near historical levels during late 2001, primarily the result of a national recession, fuel switching by some industrial users, more hydropower generation, and a mild winter.
- Prices began to rise in late 2002, and skyrocketed by the spring of 2003. A cold winter and decreasing production in Canada and the United States were the primary factors.
- Average retail natural gas prices for residential and commercial consumers in Washington State have almost doubled since early 1999.
- Concern over high gas prices and a production shortfall, spurred U.S. Department of Energy Secretary Spencer Abraham to ask the National Petroleum Council to undertake a new study on natural gas in the United States and North America. A draft of this study was released in September of 2003.

Supply

- North America has a substantial gas resource, with proved reserves of approximately 280 Tcf and total resources of approximately 2,100 Tcf. Approximately 1,400 Tcf of natural gas has been consumed in North America.
- Much of the remaining resource is unconventional or very remote and consequently is more costly and risky to develop. A significant amount is located in restricted access areas, where future development is uncertain
- U.S. natural gas production has not kept pace with U.S. demand growth over the last 10 years despite increasing exploration and drilling activity.

- Until 2001 the supply gap was minimal due to favorable weather, abundant hydropower generation, and strong growth in gas imports from Canada.
- Natural gas forecasts prepared in 1999 by the National Petroleum Council (NPC) and in 2001 by the Energy Information Administration (EIA) were overly optimistic about supply (and demand) growth through 2020. These forecasts had the unfortunate effect of encouraging additional natural gas usage.
- More recent natural gas forecasts by the NPC (2003) and the EIA (2004) contain significant downward revisions in future resource availability, gas production, and gas demand. The NPC forecast revised the U.S. production for 2015 downward by 5.5 Tcf (per year), while the EIA revised its forecast U.S. production in 2015 downward by 4.6 Tcf.
- Canadian production is expected to be flat or grow minimally over the next several years, and may begin to decline after 2010. Imports from Canada will no longer be able to cover the complete U.S. production shortfall.
- Mexican gas supply is lagging internal gas demand, necessitating increasing imports from the United States.
- Arctic gas resources are cost competitive in the current market ($5/MMBtu) and are likely to be developed during the next 10 years.
- LNG imports are currently cost competitive and are expected to account for as much as 10 percent of U.S. supply by 2010.
- Washington State does not produce natural gas and primarily imports gas from Canada and the Rocky Mountain regions.
- Washington State is situated relatively near the Rocky Mountain gas supply basins, which is one of the few areas where U.S. production is expected to grow.
- New pipeline connections mean Washington State will have to compete with the Midwest and California for natural gas from the Rocky Mountain region.
- Washington State is located relatively close to the Canadian gas hubs where future Arctic natural gas could be delivered.

Demand

- North American natural gas demand increased by approximately 25 percent, or slightly more than 4 Tcf/year, during the 1990s. Demand in Washington State increased even more rapidly during this time period: up by more than 50 percent, or about 100 Bcf /year.
- Much of the demand growth was in the electric power generation sector where nationally consumption increased by approximately 60 percent or 2 Tcf/year.
- Industrial consumption also increased rapidly during the 1990s, about 1.2 Tcf/yr nationally, equivalent to approximately 17 percent. Much of this growth was due to expansion of combined heat and power generation.
- During the 1990s regional gas price differentials diminished as a continental gas market emerged. Shortages and high prices in one region now significantly impact other regions.

- The 1999 NPC and 2001 EIA demand (and supply) forecasts were extremely bullish, forecasting annual U.S. demand exceeding 30 Tcf/year by 2010 to 2015.
- The 2003 NPC report reduced the forecast U.S. demand for 2015 by just over 4 Tcf/year.
- At the old market prices, natural gas demand exceeds available supply, making higher prices necessary to bring demand and supply back into equilibrium.
- Higher prices have resulted in industrial demand destruction and limited fuel switching.
- Washington State households, businesses, and industry continue to become more energy efficient: Washington's energy consumption per constant dollar of gross state product declined by 40 percent form 1980 to 2000.
- Gas demand growth forecasts for the Pacific Northwest electricity sector over the next 10 years have been scaled back: Annual gas forecast demand growth in the electric generation sector was reduced from 9.2 to 4.0 percent. This reduction was primarily due to the permanent loss of most of the Northwest aluminum industry – a large consumer of electricity.
- Population growth and the increased emphasis on natural gas for electric power generation are the underlying causes of regional natural gas demand growth.
- Efficiency and conservation are the most important near-term factors for reducing natural gas demand, and upward price pressure.
- Fuel switching in the industrial sector can reduce demand in the very near term: days to weeks time frame.
- Renewable power generation is an important mid- to long-term factor for reducing natural gas demand.

Natural Gas Price Volatility

- Natural gas price volatility will remain as long as supply and demand remain in tight balance.
- With a tight supply-demand balance the severity of seasonal weather (cold winter, hot summer) has the largest impact on natural gas price and volatility. Economic activity and gas storage levels also impact price and volatility.
- High gas prices lead to demand destruction in the industrial sector, which has significant economic consequences.
- Price forecasts made during the 1990s and through 2001 were extremely optimistic about the potential for a small increase in gas price to bring significant quantities of new gas supply to the market
- In the past, the fuel switching abilities of many businesses helped dampen price volatility. Low gas prices during the 1990s and more stringent environmental regulations have reduced the fuel-switching potential at national and regional levels.
- LNG imports, Arctic gas, efficiency and conservation programs, and renewable energy resources, all have the potential to dampen price volatility.
- Natural gas storage helps utilities and power generators meet variations in demand and dampen price volatility. The increasing use of natural gas as a fuel for power generation will necessitate changes in gas storage volumes and patterns.

Infrastructure

- Due to recent expansions, the pipeline system in the Pacific Northwest is fully integrated into a North American pipeline system and as a result, a North American gas market.
- Much of the recent capacity additions in the western United States are directed towards supplying California and the Midwest.
- The fraction of natural gas coming to the Northwest from the Rockies is increasing relative to that from Canada.
- Although storage capacity has increased in the Northwest, reliance on storage has increased more so, largely due to the use of storage for hedging against price instability.