

# Table of Contents

1.0 Executive Summary .....	1-1
2.0 Introductory Discussion .....	2-1
2.1 Summary of the Electric Industry Restructuring Scenarios .....	2-1
2.2 Quantifying and Applying the Electricity Price Impacts .....	2-2
2.2.1 Short-run and Long-run Generation Market Price Perspectives .....	2-3
2.2.2 Quantifying Utility Revenue Impacts and Stranded Costs .....	2-3
2.3 Quantifying the Economic and Fiscal Impacts .....	2-3
2.3.1 Application of Electricity Price Impacts .....	2-4
2.3.2 The REMI Economic Forecasting Model .....	2-4
3.0 Traditional Electric Industry Analysis .....	3-1
3.1 Methodology of the Traditional Scenario Price Analysis .....	3-1
3.2 Present Electricity Consumption and Prices in Wyoming .....	3-2
3.2.1 Consumer Class Electricity Consumption .....	3-2
3.2.2 Present Electricity Prices in Wyoming .....	3-2
3.2.3 Functional Components of Electricity Price .....	3-2
3.3 Forecasts of Electricity Consumption .....	3-5
3.4 Representation of the Regional Utility Supply Systems .....	3-5
3.4.1 Summary of the Regional Supply Representation .....	3-6
3.4.2 Transmission Constraints and Usage .....	3-6
3.4.3 Forecasted Generation Fuel Prices and Operating Expenses .....	3-8
3.4.4 Firm Power Transactions and New Generation Capacity .....	3-10
3.4.5 Inter-Regional Wholesale Power Markets .....	3-10
3.4.6 Costs Associated with Embedded Generation Assets .....	3-11
3.4.7 Transmission and Distribution Price Component Forecast .....	3-11
3.5 Resultant Electric Price Forecasts .....	3-12
3.5.1 Electric Generation Component Price Forecast .....	3-12
3.5.2 Overall Electric Price Forecast by Consumer Class .....	3-12
4.0 Electric Industry Analysis of the Four Restructuring Scenarios .....	4-1
4.1 Representation of the Flash-Cut Retail Access Scenario .....	4-1
4.1.1 The Competitive Generation Market .....	4-1
4.1.2 The Competitive Market Energy Price .....	4-2
4.1.3 The Market Value of Capacity .....	4-4

4.1.4	Resultant Competitive Market Prices .....	4-6
4.2	Impacts of the Flash-Cut Retail Access Scenario .....	4-6
4.2.1	Consumer Class Price Impacts to Stranded Cost Recovery .....	4-6
4.2.2	Utility Stranded Costs Impacts .....	4-8
4.3	Impacts of the Alternate Restructuring Scenarios .....	4-9
4.3.1	Impacts of Phased Retail Access (Scenario 2) .....	4-11
4.3.2	Impacts of Large Industrial Retail Access (Scenario 3) .....	4-11
4.3.3	Impacts of Non-Participation in Wyoming (Scenario 4) .....	4-13
4.4	Analysis of Nation-Wide Electric Price Impacts .....	4-14
5.0	Baseline Economic and Fiscal Trends .....	5-1
5.1	The Baseline Wyoming Economy .....	5-1
5.1.1	Employment: Full and Part Time Jobs .....	5-1
5.1.2	Employment Earnings .....	5-3
5.1.3	Resident Population .....	5-4
5.1.4	Per Capita Income .....	5-4
5.1.5	The Economic Context for Electric Utility Restructuring .....	5-4
5.2	The Wyoming Revenue Baseline .....	5-6
5.2.1	The Current Wyoming Tax Base .....	5-6
5.2.2	Baseline Revenue Projections .....	5-7
5.3	The Distribution of Wyoming Economic Activity .....	5-10
6.0	Economic & Fiscal Analysis of the Four Restructuring Scenarios .....	6-1
6.1	Flash-Cut Retail Access .....	6-1
6.1.1	Overall Economic Impacts .....	6-1
6.1.2	Impacts for Wyoming Economic Sectors .....	6-2
6.1.3	Impacts for Wyoming Revenue .....	6-4
6.2	Phased Retail Access (Scenario 2) .....	6-4
6.2.1	Overall Economic Impacts .....	6-4
6.2.2	Impacts for Wyoming Economic Sectors .....	6-7
6.2.3	Impacts for Wyoming Revenues .....	6-7
6.3	Large Industrial Retail Access (Scenario 3) .....	6-7
6.3.1	Overall Economic Impacts .....	6-7
6.3.2	Impacts for Wyoming Economic Sectors .....	6-8
6.3.3	Impacts for Wyoming Revenues .....	6-8
6.4	Non-Participation in Wyoming (Scenario 4) .....	6-8
6.4.1	Overall Economic Impacts .....	6-8

6.4.2	Impacts for Wyoming Economic Sectors .....	6-9
6.4.3	Impacts for Wyoming Revenues .....	6-9
7.0	Sensitivity Scenarios of Flash-Cut Electric Restructuring .....	7-1
7.1	Electric Generation Market Price Variation .....	7-1
7.1.1	Electric Price and Stranded Cost Impacts .....	7-1
7.1.2	Economic and Fiscal Impacts .....	7-4
7.2	Inter-Class Electricity Price Variation .....	7-7
7.2.1	Electric Price Impacts .....	7-7
7.2.2	Economic and Fiscal Impacts .....	7-7
7.3	Nation-Wide Electricity Price Variations .....	7-9
7.4	Impact of Additional Electricity Export from Wyoming .....	7-10
8.0	Feasibility and Impact of New Wyoming Power Generating Capacity .....	8-1
8.1	Background Considerations to the Feasibility Analysis .....	8-1
8.1.1	Wyoming Generation Supply and Load Balance .....	8-1
8.1.2	Regional Transmission System Capability .....	8-1
8.2	Evaluation of New Gas-Fueled Generation .....	8-1
8.3	Methodology of the Coal-Fueled Generating Capacity Analysis .....	8-2
8.3.1	Inter-Regional Market Considerations .....	8-3
8.3.2	New Transmission Line Price and Operating Characteristics .....	8-4
8.3.3	Cost and Price Assumptions for New Generating Capacity .....	8-4
8.4	Results of the Coal-Fueled Generating Capacity Evaluation .....	8-5
8.4.1	Impact of Project Scale and Ownership Assumptions .....	8-7
8.4.2	Trade-Off Between Coal Transportation and Electricity Transmission .....	8-7
8.4.3	Considerations Regarding Restructuring Scenarios 2 thru 4 .....	8-8
8.5	Economic and Fiscal Impacts of Coal Generating Capacity .....	8-8
9.0	Additional Conclusions and Insights .....	9-1
9.1	Electric Industry Perspective .....	9-1
9.2	Economic and Fiscal Analysis .....	9-1

## Appendix A: Comments of the Steering Committee and Other Involved Parties

- Black Hills Power & Light Company
- PacifiCorp
- Tri-State Generation & Transmission Cooperative
- Wyoming Industrial Electric Consumers
- Wyoming Rural Electric Association

### List of Tables

4-1 State-Wide Average Price Impacts for the Flash-Cut Scenario .....	4-7
4-2 State-Wide Average Electricity Price Impacts for Scenarios 1 thru 4 .....	4-13
4-3 Comparative Summary of U.S. Price Impacts for the Flash-Cut Restructuring .....	4-15
6-1 Comparative Economic Impacts of the Restructuring Scenarios .....	6-6
7-1 State-Wide Average Electricity Price Impacts for Sensitivity Scenarios (Average Annual Percentage Impact) .....	7-3
7-2 Wyoming Economic Impacts of the Sensitivity Scenario .....	7-4
8-1 Regional Annual On-Peak Market Clearing Energy Prices .....	8-3
8-2 Economic Impacts of Additional Generating Capacity in Wyoming .....	8-10

### List of Figures

3-1A U.S. Wyoming-Idaho Electricity Prices 1995 Actual Data .....	3-3
3-1B Comparative Prices in Wyoming - Low Price and High Price Utility .....	3-3
3-2A Electricity Functional Costs in Wyoming 1995 Actual Data .....	3-4
3-2B Electricity Sales Growth Forecast - State of Wyoming .....	3-4
3-3 Representation of Regional Supply Markets .....	3-7
3-4A Coal & Gas Fuel Price Growth .....	3-9
3-4B Marginal Energy Production Cost - Hourly Depiction .....	3-9
3-5A Traditional Scenario Generation Prices .....	3-13
3-5B Traditional Scenario Overall Electric Prices .....	3-13
4-1 Market Energy Revenue and Expense-Per Unit of Energy Sold .....	4-3
4-2A Forecast of the Value of Capacity; Dollar per MW and Cent Per kWh .....	4-5
4-2B Price Comparison: Generation Only; Flash-Cut Restructuring .....	4-5
4-3 Price Impact Prior to Stranded Cost Recovery-Flash Cut Scenario .....	4-8
4-4A Stranded Costs of Flash-Cut Scenario; Utilities Serving Wyoming .....	4-10

4-4B Stranded Costs of Flash-Cut Scenario; Wyoming .....	4-10
4-5A Price Impact Prior to Stranded Cost Recovery; State-Wide Average .....	4-12
4-5B Impact of Restructuring Scenarios; Stranded Costs in Wyoming .....	4-12
5-1A Employment Jobs Growth: Wyoming & U.S. ....	5-2
5-1B Wyoming Earnings Growth (vs Jobs) .....	5-2
5-2A Wyoming Population Growth (vs Jobs) .....	5-5
5-2B Per Capita Income Growth: Wyoming and U.S. ....	5-5
5-3A Major Wyoming Revenues (vs. Jobs, Income, Population .....	5-8
5-3B Four Major Revenue Sources in Wyoming .....	5-8
5-4 Wyoming Counties and Major Cities .....	5-11
6-1A Flash-Cut Retail Access: Overall Economic Effects .....	6-3
6-1B Flash-Cut Retail Access: Sector Employment Effects .....	6-3
6-2A Flash-Cut Retail Access: Major Revenues (vs Income, Population) .....	6-5
6-2B Flash-Cut Retail Access: Four Major Wyoming Revenue Sources .....	6-5
7-1A Price Impact Prior to Stranded Cost Recovery-Market Price Scenario .....	7-2
7-1B Price Impact Prior to Stranded Cost Recovery-Inter-Class Price Scenario .....	7-2
7-2A Stranded Costs of Flash-Cut Restructuring - Market Price Scenarios .....	7-5
7-2B Stranded Costs of Flash-Cut Restructuring - Market Price Scenarios .....	7-5
7-3 Sensitivity Scenarios vs Scenario #1 Peak Year 1998 Employment Impacts .....	7-6
7-4A High Market Price Scenario: Overall Economic Effects .....	7-8
7-4B High Market Price Scenario: Sector Employment Effects .....	7-8
8-1A Coal-Fueled Generating Capacity Revenues-Excluding Transmission .....	8-6
8-1B Coal-Fueled Generating Capacity Revenues-Including Transmission .....	8-6
8-2A Additional Generation in Wyoming: Overall Economic Effects .....	8-9
8-2B Additional Generation in Wyoming: Sector Employment Effects .....	8-9
8-3A Additional Generation in Wyoming: Overall Revenue Effects .....	8-11
8-3B Additional Generation in Wyoming: Four Major Revenue Sources .....	8-11

# 1.0 Executive Summary

## Study Background and Context

- This Study was commissioned by and coordinated with the Wyoming Public Service Commission and the Electric Restructuring Steering Committee, representing several stakeholder groups in Wyoming. The Study addressed the potential impacts of electric restructuring on electricity prices and the economy in Wyoming over the 1998-2007 time horizon. Specifically, the potential impacts of *retail access* were addressed, whereby consumers would have the opportunity to purchase electricity directly from multiple suppliers in a competitive market.
- At present, electricity prices are comparatively low in Wyoming, with state-wide prices averaging 30 percent below nation-wide levels. Consumers in several states to the north and west of Wyoming experience even lower average electricity prices. There is a relatively wide range of electricity prices offered by the utilities serving Wyoming, with some consumers experiencing prices 25 percent higher than the state-wide average. Wyoming is a relatively large exporter of electricity, with exports exceeding the total in-state usage.
- The value and pricing of electricity in a competitively restructured power generation market is presently the subject of much speculation and uncertainty throughout the U.S. This Study applied a competitive regional market representation to the restructuring scenarios, based on estimated marginal prices to reliably generate electricity. The representation assumes market prices are constrained in the near-term (1998-2002) due to surplus electric capacity in the Western U.S. power market. This was applied as a short-run phenomenon, after which long-run market prices reflecting a balance of demand and supply were assumed. A simplified version of this representation was applied to the U.S overall, to estimate the price effects of electric utility restructuring nation-wide.
- Economic impacts were estimated using an economic-demographic simulation model formulated to represent the State of Wyoming and the remainder of the U.S. Fiscal (state revenue) impacts were estimated using a version of the Wyoming Economic Forecast system developed by Wyoming's Consensus Revenue Estimating Group, with adaptations of economic measures as drivers of key portions of the Wyoming revenue base.

## The Flash-Cut Restructuring Scenario

- The baseline simulation of a *Flash-Cut* Restructuring scenario, whereby all consumers in Wyoming and elsewhere are assumed immediately eligible for access to competitive power markets, yielded first year (1998) state-wide average electricity price reductions

of 16 percent -- prior to inclusion of surcharges for recovery of stranded utility costs. Consumers presently served by the highest-priced utilities experienced first year price reductions averaging 25 percent (again prior to stranded cost recovery). Price impacts in succeeding years were progressively lower until year 2003, at which time the long-run market prices were assumed in full effect. State-wide electricity prices in the 2003-2007 time period averaged a modest five percent below the traditional regulated scenario.

- Stranded utility costs reflect the annual revenue lost by electric utilities under a restructuring scenario in comparison to the traditional regulated scenario, less any net operational efficiencies resulting from an open regional power market. Stranded cost recovery spans the entire spectrum of stakeholder interests in electric industry restructuring. At one end of the spectrum, stranded costs have the potential of financially damaging most utilities if they are not fully recovered. Conversely, if stranded costs are fully recovered, they could temporarily negate the electricity price reductions from electric restructuring. State-wide utility stranded costs of the baseline Flash-Cut Restructuring scenario were estimated to be \$86 million in the first year, and averaged \$27 million in the late years of the Study. Sensitivity analysis indicated that restructured power market prices 10 percent higher would reduce the first year (1998) stranded costs to \$63 million, and market prices 10 percent lower would increase first year stranded costs to \$109 million (a resultant range of roughly plus or minus 25 percent).
- Within a transition period for recovery of stranded costs, the electricity price reductions to consumers would be less than the values summarized above, in general proportion to the stranded cost recovery. The amount and timing of electricity price reductions would depend in part on the possible impacts of stranded cost mitigation efforts such as refinancing of assets, the quantitative analysis of which was beyond the scope of this Study.
- A brief evaluation of U.S. electricity prices for the Flash-Cut scenario indicated nationwide percentage price reductions two-to-three times greater than the state-side reductions in Wyoming. Despite Wyoming losing some of its electricity price advantage, the baseline Flash-Cut restructuring scenario continued to exhibit a 24 percent average price advantage for Wyoming.
- The short-run electricity price reductions quantified above would be experienced only if utilities were precluded from recovering any portion of their stranded costs. A plausible range of state-wide economic and fiscal impacts in Wyoming was evaluated for all years of the Study, based on long-run competitive power market prices in Wyoming and the U.S. The resultant economic impacts most directly represent the potential post-transition impacts from electric restructuring. Within a transition period

for recovery of stranded costs, the economic impacts would be less than those presented below, in general proportion to the recovery of stranded costs.

- Economic analysis of the Flash-Cut Restructuring scenario based on the long-run competitive power market prices indicated that overall impact on the Wyoming economy would be positive but small, and perhaps not discernable in the context of possible changes in other economic factors over the next decade. Initially, Flash-Cut restructuring would cause total jobs and personal income levels to be about one-half percent greater than expected under the Traditional scenario. This effect would dissipate in later years, and jobs and income eventually would return to nearly the levels expected under the Traditional scenario. Under Flash-Cut restructuring, the analysis indicated resident population levels slightly lower in all years (perhaps one-tenth percent) compared to the Traditional Scenario, due to a small decrease in Wyoming's overall attractiveness to economic migration compared to the rest of the U.S.
- Economic analysis of the Flash-Cut scenario indicated small but almost negligible changes in the composition of Wyoming's economy. Flash-Cut restructuring would cause employment levels in most economic sectors to be somewhat higher than expected in the Traditional Scenario, with the exception of state and local government. Employment levels in that sector were slightly lower in all years than the Traditional scenario, apparently correlated to the estimated effects on total population.

#### **Flash-Cut Restructuring Contingencies and Sensitivities**

- Sensitivity analyses were conducted assuming competitive power market prices in Wyoming 10 percent higher or 10 percent lower than those estimated in the baseline Flash-Cut scenario evaluation. The resulting state-wide economic effects showed very small increases (with lower prices) or small decreases (with higher prices) relative to those estimated for the baseline Flash-Cut scenario.
- A sensitivity analysis was conducted assuming relative market advantage or other market factors were to further reduce industrial consumer electric generation market prices by 20 percent, and comparably increase residential consumer market prices. This scenario resulted in significant state-wide electricity price *increases* for residential consumers, and slightly decreased benefits to the Wyoming economy in comparison to the baseline Flash-Cut scenario.
- Additional sensitivity analyses were conducted to isolate effects to the Wyoming economy from changes in electricity prices in Wyoming versus the rest of the nation. These assessments suggest that the economic effects of restructuring in Wyoming would be attributable mainly to changes in electricity prices nation-wide -- changes which stimulate or dampen the national economy and the markets for Wyoming exports of energy and other products and services.



### **Alternative Restructuring Implementation Scenarios**

- Three alternate restructuring implementation scenarios defined by the Steering Committee were evaluated in the Study. Results of these scenarios were consistent with the Flash-cut scenario, with electricity price and economic impacts generally reduced due to phased or partial implementation of retail access. A scenario whereby Wyoming is the only state in the U.S. to not authorize retail access exhibited economic and revenue impacts slightly less positive than the Flash-Cut restructuring scenario.
- An evaluation of new electric generating capacity in Wyoming within a restructured power supply market indicated that new capacity fueled with natural gas would not likely be attractive due to the relative cost of transporting the electricity to capacity-deficit load centers. The baseline market analysis of a 700 MW coal-fueled generating unit indicated a short-fall of revenue as needed to earn a target rate of return. Economies of scale associated with project size and financing of the transmission capacity were identified as affecting financial feasibility of the coal-fueled generating capacity, as well as variation of the future market prices.

### **Additional Observations**

- Although the explicit analysis of market advantage potentially exhibited by suppliers or consumers in an open power generation market was beyond the scope of this Study, this topic possibly poses the largest uncertainty regarding the electric price and economic impacts of restructuring in Wyoming or elsewhere. Relatively small market deviations from the fully competitive electricity prices could overshadow the impacts quantified in this Study.
- The state-wide electricity price reductions and economic impacts found in the Study do not appear to provide the rationale for or against a particular restructuring policy in the State. However, consumers served by higher-priced utilities would be somewhat more impacted, and the price of electricity is certainly a more important cost factor for some households and businesses than others within the State. The elimination of various price-averaging effects and regulated electricity price policies under restructuring could expand the price differentials experienced by certain consumers and groups.
- The constrained transmission system for export of power from the Wyoming area would likely limit any 'bid-up' of electricity prices in Wyoming to serve higher-priced markets elsewhere.

## 2.0 Introductory Discussion

This Section provides an overall perspective of the Study methodology and the specific restructuring scenarios analyzed. Additional discussion of the methodology for each major task of this Study is included within later sections of this report.

Broadly speaking, electric industry restructuring may refer to most any change in the regulatory and market structures under which the industry operates. This Study specifically addresses the potential impacts on electricity prices and the economy in Wyoming resulting from all or some consumers having the opportunity to purchase electricity directly from multiple suppliers in a competitive market place. This opportunity is referred to within this report as *retail access*.

Although retail access to electric power has been broadly considered in the U.S. only within the past three years, this topic has gained great attention. The most aggressive implementation effort is underway within the State of California, which includes all investor-owned utility customers having retail access opportunities beginning January 1, 1998.

This Study includes a multi-step analytical effort focused ultimately on the potential economic and fiscal impacts in Wyoming resulting from retail access. The state-wide electricity price impacts of retail access were estimated for each major consumer class under various implementation scenarios, considering both short-run and long-run market price perspectives. The resultant utility revenue impacts and stranded costs were addressed. The estimated long-run electricity price impacts were then forwarded to the macroeconomic and fiscal analysis.

### 2.1 Summary of the Electric Industry Restructuring Scenarios

The following is a summary of the four primary restructuring scenarios defined by the Steering Committee and analyzed in this Study.

**Scenario 1:** Within Wyoming and all other states, unrestricted ("Flash-Cut") retail access is available on a non-discriminatory basis to all consumers, individually or in cooperation with others through an aggregator, on January 1, 1998.

**Scenario 2:** Electric industry restructuring proceeds in Wyoming and all other states along a class phase-in approach over a four year period. The first year would be comprised of organizational, legislative and regulatory actions to develop and implement the program. Beginning January 1, 1999, retail access would be available to all incremental large industrial loads, (those in excess of 1,000 kW), 25 percent of each individual large industrial consumer's existing load and 5 percent of all residential and commercial loads. Beginning January 1, 2000, retail access would be available to all incremental large industrial loads, 50

percent of each individual large industrial consumer's existing load, and 30 percent of all residential and commercial loads. Beginning January 1, 2001, retail access would be available to all consumers regardless of class or size.

**Scenario 3:** Within Wyoming and all surrounding states, retail access is available effective January 1, 1998, for large industrial consumers only (those with loads in excess of 1,000 kW). Lesser loads are assumed to operate under traditional circumstances without the opportunity of competitive power supply options.

**Scenario 4:** Wyoming alone elects not to participate in retail access. All other states are assumed to be operating under Flash-Cut retail access for all consumers effective January 1, 1998.

## **2.2 Quantifying and Applying the Electricity Price Impacts**

Quantifying the electricity price impacts first involved forecasting state-wide average electricity prices by major consumer class for both a Traditional Industry scenario and the Flash-Cut Restructuring Scenario. The Study period included the years 1998 through 2007. The Traditional Industry Scenario assumed that electric power generation continues to be regulated through the Study period in a manner consistent with existing cost-of-service methodologies. The Traditional Scenario analysis included a simulation of each major utility system serving the State of Wyoming, to estimate future revenue requirements and prices associated with serving all retail consumers within each utility system's jurisdiction. A simplified cost-of-service analysis provided an estimate of future prices for each major class of consumers -- residential, commercial and industrial.

The Flash-Cut Restructuring Scenario implies a highly competitive market for power generation. The industry analysis for this scenario applied marginal pricing concepts within a competitive market representation.

The three additional industry restructuring scenarios reflecting phased or partial retail access were also analyzed. These scenarios, which imply a partially competitive and partially regulated power generation market for some or all years, were analyzed as combinations of the earlier scenarios. In addition, a scenario explicitly reflecting additional generating capacity in Wyoming was evaluated in the restructured power generation environment.

The key outcomes of this industry modeling effort were the electricity price impacts experienced by each of the major consumer classes under each restructuring scenario. The changes in price for each consumer class were carried forward to the macroeconomic analysis stage of the effort.

### **2.2.1 Short-run and Long-Run Generation Market Price Perspectives**

The competitive electric generation market representation applied within the Study assumes that market prices would fully reflect the marginal value of electric capacity when supply and demand are in balance. To keep the markets in balance, electric capacity must be added consistent with growth of consumer demand. It was assumed that to entice owners of new generating capacity to commit the associated investment, market prices would be sufficiently high to earn a return on investment comparable to other investment options.

The competitive market representation also assumed that the present electric capacity surplus in the western U.S. would result in short-term capacity prices significantly less than the long-run equilibrium. This is assumed in the Study to be a short-term phenomenon, with demand-and-supply equilibrium assumed beginning in the year 2003, when new electric capacity is estimated to be needed in the region.

### ***2.2.2 Quantifying Utility Revenue Impacts and Stranded Costs***

To isolate the electric price impacts and resultant macroeconomic impacts of retail access, each of the scenarios assumed the same usage of electricity each year of the Study. In this situation, the price impacts quantified within a restructuring scenario result in a one-for-one reduction of revenue for the electric utilities. This loss of annual revenue, net of any operational efficiencies, represents regulated scenario costs which could not be recovered within an unrestricted competitive market -- referred to here as stranded costs.

The analysis of specific stranded cost mitigation opportunities, such as refinancing of assets or renegotiation of firm power contracts, was beyond the scope of this Study. Assuming that mitigation methods could reduce stranded cost exposure, the remaining stranded costs would be some amount less than presented in this Study.

## **2.3 Quantifying the Economic and Fiscal Impacts**

Forecasts of statewide economic and fiscal impacts were based on expected changes in electricity prices under each restructuring scenario in Wyoming and the rest of the nation, as well as an additional scenario assuming the construction and operation of a coal-fired power plant and transmission line for export of additional electricity from Wyoming.

The point of reference, or "Baseline", for the economic impact assessment was the Wyoming Economic Forecast, prepared by the Wyoming Division of Economic Analysis. In cooperation with the Division, the current forecast was extended on an unofficial basis to cover the 10-year Study period. The Baseline for the fiscal impact was the Wyoming Revenue Forecast, which was also extended on an unofficial basis to cover the assessment forecast period, in cooperation with the Division of Economic Analysis and Wyoming's Consensus Revenue Estimating Group (CREG).

The analysis of the economic impacts of expected changes in electricity prices applied a REMI<sup>1</sup> economic-demographic forecasting and simulation model, formulated specifically for the State of Wyoming and the rest of the U.S. The analysis of fiscal impacts applied a version of the Wyoming CREG system, but with adapters of REMI measures of economic impact as drivers of key portions of the Wyoming revenue base.

### ***2.3.1 Application of the Electricity Price Impacts***

The economic and fiscal impacts were quantified assuming long-run electricity price impacts in all years of the study, prior to inclusion of utility stranded costs. In this manner, the economic and fiscal impacts most directly reflect the potential post-transitional impacts from restructuring. Within a transition period for recovery of stranded costs, the price and follow-on economic and fiscal impacts would be less than presented in this study. The amount of impact would in part depend on the mitigation of stranded costs. At one extreme, if stranded costs were fully recovered and no mitigation was assumed, the electricity price effects (and their economic and fiscal impacts) would be limited to any net operational efficiencies of a competitive market. At the other extreme, if total mitigation were assumed, the long-run price effects (and their economic and fiscal impacts) would be fully realized during the restructuring transition period.

### ***2.3.2 The REMI Economic Forecasting Model***

As mentioned, the Study applies a REMI model to simulate the impacts of various electric price change scenarios on employment, personal income, and population in Wyoming overall and in Wyoming's key industry sectors. A standard REMI model combined information on the input-output structure of the economy with econometric estimates of the effects on output of labor, energy and capital demand, population and labor supply, industry market shares, industry wage levels, prices of intermediate goods, and business profitability. The REMI framework is a partial equilibrium model that attempts to account for all the key features of a regional economy relevant to predicting impacts. The model responds in a logical way based on economic theory to changes in an area's economy.

Changes in electric rates have both direct and secondary impacts. The direct impacts of changes in electric rates occur as industries and household change production and spending behavior, respectively. Secondary impacts occur as industries supply those that are directly affected adjust their production and spending. Input-output-based economic models such as REMI provide the means to measure both the direct and indirect impacts of changes in the cost of doing business, household expenditures, and income distribution across the

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<sup>1</sup>Regional Economic Models Inc; Amherst, Massachusetts

economic sectors. Input-output analysis provides accurate estimates of changes in output needed throughout the entire economy to meet a new level of demand for the output of any given industry.

## 3.0 Traditional Electric Industry Analysis

This section of the report discusses the analysis conducted for the Traditional Electric Industry scenario, including the comparative electric price forecasts developed for later comparison against the Restructuring Scenarios.

### 3.1 Methodology of the Traditional Scenario Price Analysis

Each major electric utility system serving Wyoming consumers was explicitly simulated within the Study. This included an hourly representation of consumer loads, generation resources, firm power transactions, and spot power transactions for each electric system. The costs of owning and operating the supply resources to meet consumer electric needs were estimated in future years. These costs were applied within a simplified class cost-of-service analysis to estimate future prices for the consumer classes of each utility system. The methodology of this analysis is briefly described here, with additional detail provided in later subsections.

The following utility systems were explicitly simulated within the Study. These utilities account for 95 percent of electricity sales in Wyoming.

- PacifiCorp, including Cheyenne LF&P as a full requirements purchaser.
- Black Hills Power & Light Company, including the Wyoming load of Montana-Dakota Utilities as full requirements purchaser<sup>1</sup>.
- Tri-State Generation & Transmission<sup>2</sup>.
- Powder River Energy Corporation.
- Wyoming Municipal Power Agency.

The prices of electricity from utility systems not explicitly simulated were compared against prices for the simulated systems to verify that prices were reasonably similar. Within the later scenario comparisons, the revenues were adjusted to reflect total sales in the State.

This Study focuses on the comparative prices of electricity and related impacts across various future scenarios. The absolute prices are not directly relevant to the economic and fiscal analysis discussed later in this report.

### 3.2 Present Electricity Consumption and Prices in Wyoming

Wyoming consumers are currently served by several electric utilities having specific geographic franchised service areas. The largest proportion of electric usage in Wyoming

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<sup>1</sup>Black Hills also serves a portion of load for the City of

<sup>2</sup>Tri-State also serves a portion of load for the City of Torrington.

is served by investor-owned utilities (73 percent), followed rural electric cooperatives (23 percent), and municipal utilities (4 percent).

### **3.2.1 Consumer Class Electricity Consumption**

Wyoming experiences a per-capita usage of electricity approximately twice that of the U.S. overall, owing to the relatively high concentration of industry within the state. Based on information provided by electric utilities serving the State, industrial consumer class energy usage accounted for 62 percent of total electricity usage within Wyoming in 1995. This compares to industrial sales representing about 35 percent of electricity sales nationwide. Approximately one-third of industrial electricity usage in Wyoming occurs at sites with a peak usage of at least 1,000 kW. The remaining electricity sales in Wyoming are relatively evenly divided between residential and commercial consumers.

### **3.2.2 Present Electricity Prices in Wyoming**

State-wide electricity prices in Wyoming are very low in comparison to the U.S. overall. Average electricity prices for major consumer classes are summarized for Wyoming and the U.S. overall on Figure 3-1A. Based on a comparative mix of consumer class energy usage, state-wide average electricity prices in Wyoming are 30 percent below the U.S. average. However, several states to the north and west of Wyoming experience even lower average electricity prices. Figure 3-1A also summarizes consumer class average prices in the state of Idaho.

A significant variation of electricity price exists within the State of Wyoming. Figure 3-1B summarizes prices for a low price utility and a high price utility in Wyoming. These average class prices may be somewhat affected by the specific load characteristics of consumers served by the utilities, which is not readily discernable from available price and consumer information.

### **3.2.3 Functional Components of Electricity Price**

The prices discussed above represent the bundled prices for delivered electricity, combining the costs associated with the generation, (bulk) transmission, and (local) distribution of electricity by utilities. Because this Study focuses on the impact of



### Figures 3-1A and 3-1B

**U.S., Wyoming, Idaho Electricity Prices  
- 1995 Actual Data -**

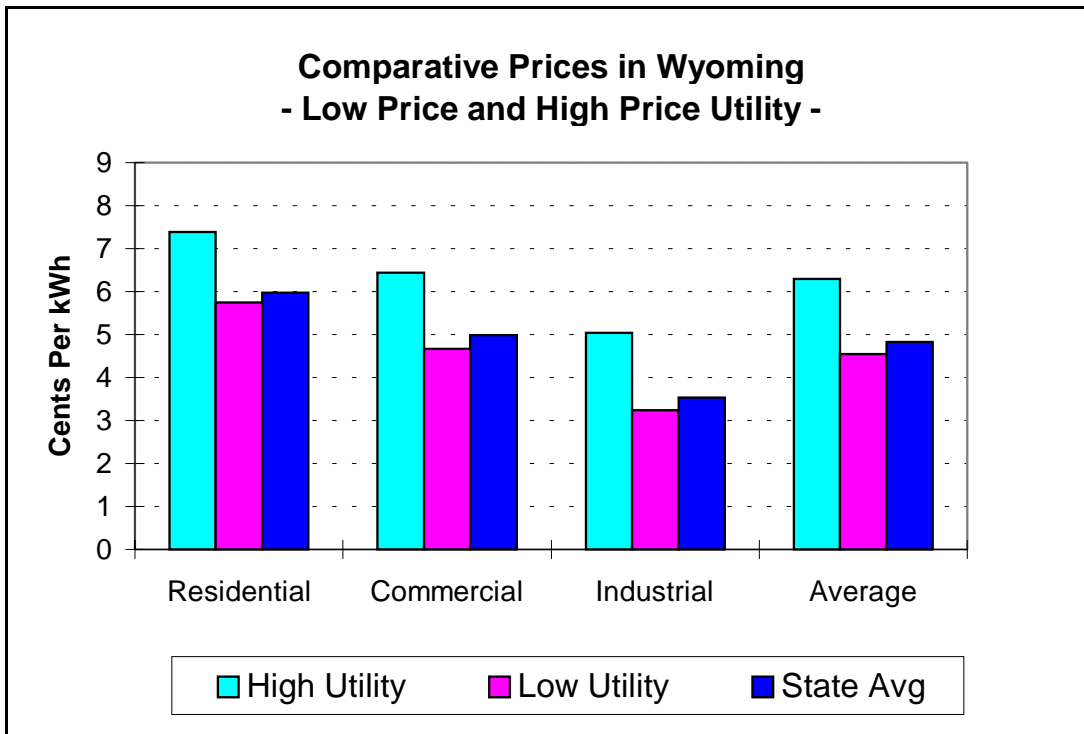
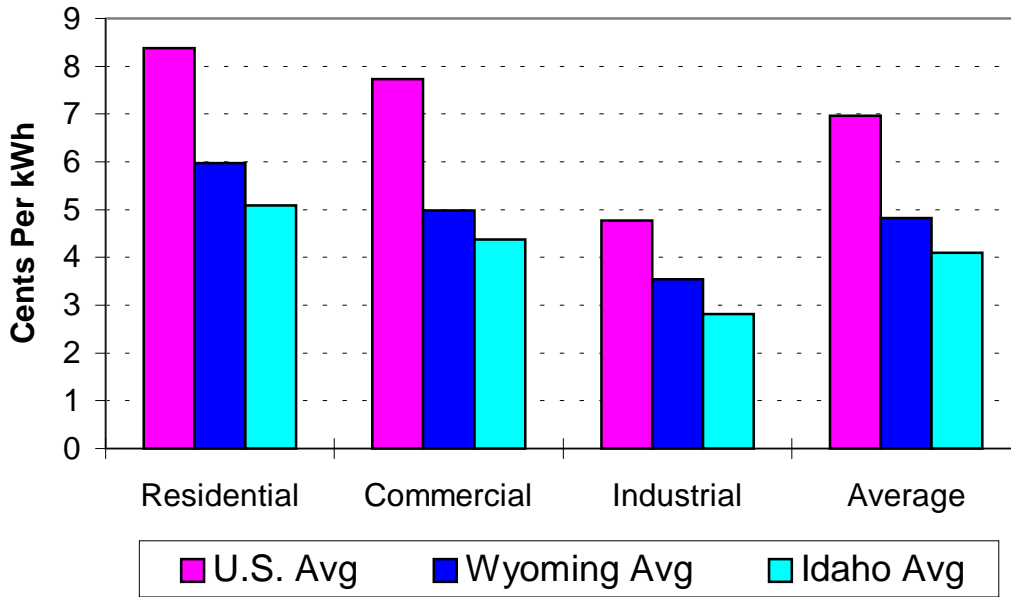
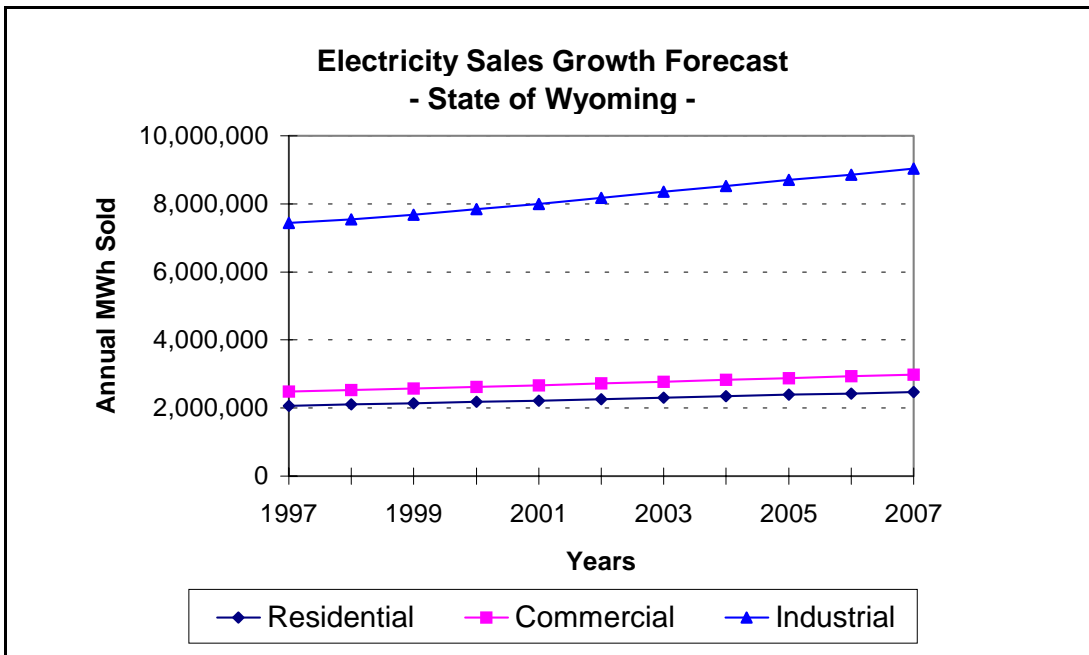
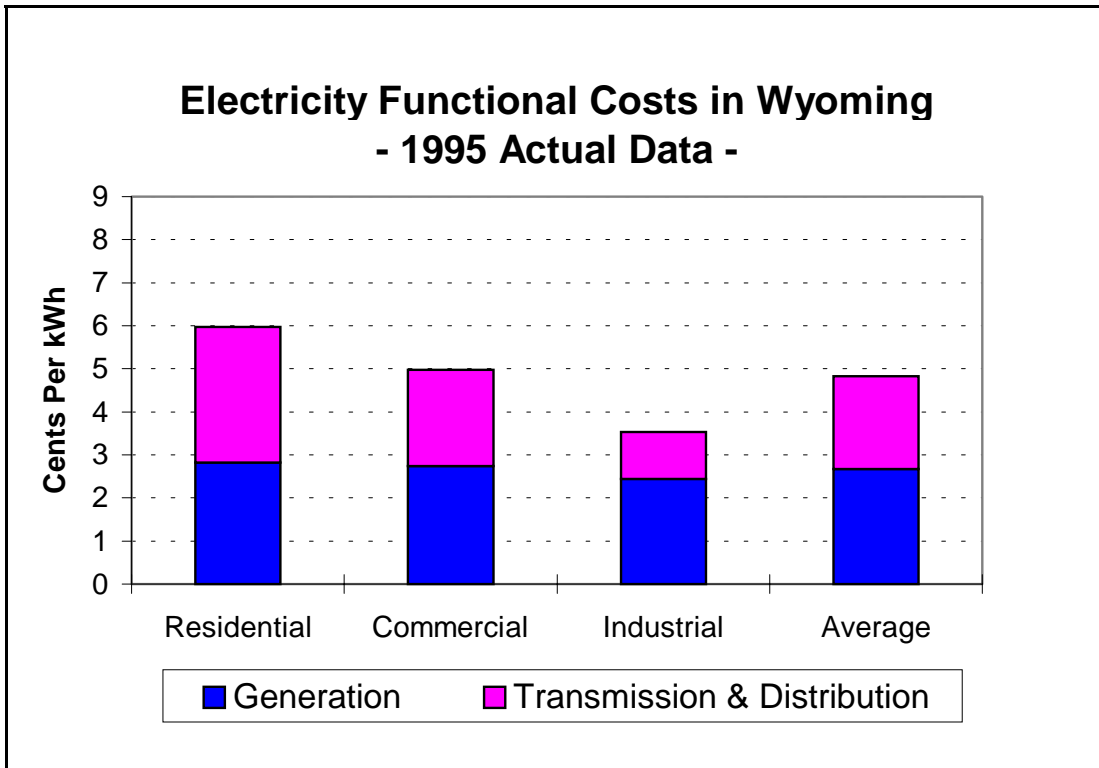


Figure 3-2A and 3-2B



competitive markets for generation of electricity, it was necessary to estimate the present price contribution of the generation function separate from the transmission and distribution functions. This was accomplished by examining recent electric cost-of-service studies provided by the Wyoming PSC and breaking out utility costs in a manner similar to these studies.

Figure 3-2A summarizes the estimated state-wide average generation and transmission/distribution functional cost contributions to overall price for each major consumer class in Wyoming. The generation and transmission/distribution functions each represent roughly 50 percent of overall price to serve the residential class in Wyoming, owing to the relatively high transmission/distribution costs to serve these consumers. The generation function contribution increases to 57 percent for the commercial class and 72 percent for the industrial class.

### **3.3 Forecasts of Electricity Consumption**

The utilities serving Wyoming generally provided 10 year forecasts of electricity usage within their service territories for application within the Study. Information was also generally provided regarding projected consumer class usage Wyoming and, where applicable, other states. This information most often indicated a similar growth for each major consumer class of a utility system.

Annual electric energy sales applied in the Study for the state of Wyoming are summarized on Figure 3-2B. The average electricity sales growth rate across all consumer classes within Wyoming is estimated to be 1.9 percent over the 10 year study period. This growth rate is very similar to the average 1.8 percent projected for the entire Western U.S. grid through year 2005, based on forecasts submitted by utilities to the North-American Electric Reliability Council (NERC).

### **3.4 Representation of the Regional Utility Supply Systems**

As mentioned earlier, the traditional industry supply representation applied in the Study included explicit simulation of the existing generation resources and firm power transactions for the utilities which serve Wyoming consumers. To capture the coordinated interstate operation of those utilities which serve loads both within Wyoming and other states, the interstate electric loads and resources of these utilities were included within the simulation. In addition, the simulation included representation of the major inter-regional markets with which the utilities conduct spot market energy transactions.

### **3.4.1 Summary of the Regional Supply Representation**

The utilities serving Wyoming operate within a coordinated fashion, although the coordination does not include a centralized dispatch or resources or structured transactional pricing. The utilities transact power amongst themselves and with inter-regional utilities on a spot market basis, in addition to firm power supply contracts which are in place.

The regional utility representation applied in the Study is depicted on Figure 3-3. The Wyoming and contiguous loads served by the utilities, and related generation facilities, are modeled within Area 1 of the depiction. This includes all of the load served by these utilities, with the exception of the Western Division of the PacifiCorp system. The following utility loads and resource outside of Wyoming are included within Area 1:

<u>Utility</u>	<u>States</u>
Black Hills	South Dakota
PacifiCorp	Utah, Idaho
Tri-State	Colorado

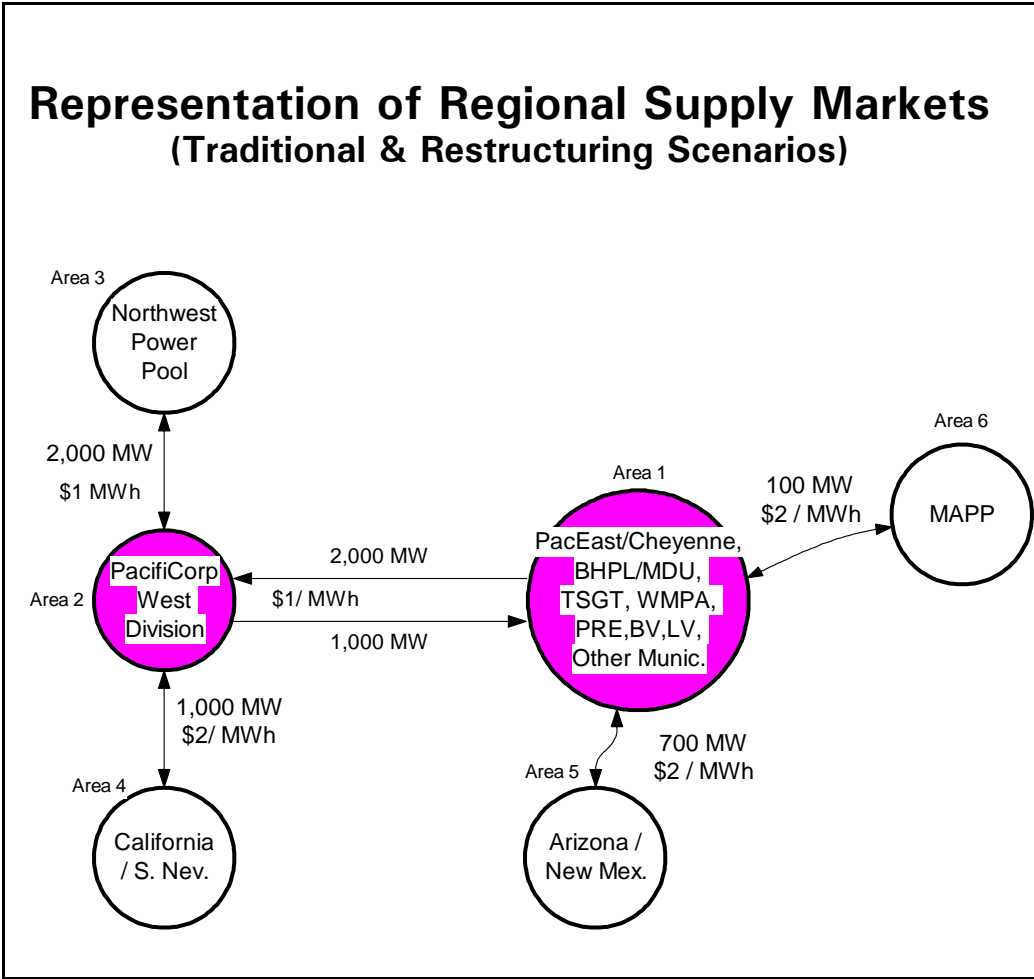
The PacifiCorp Western Division includes loads and resources within the states of Oregon, Washington and California, which are modeled within Area 2. A significant transmission constraint exists between Area 1 and Area 2, as discussed below.

Explicit modeling of the loads and generators within each conduct inter-regional market with which the electric utilities serving Wyoming conduct spot transactions would be beyond the scope of this Study. To reasonably account for the influence of these markets on the Wyoming area market, spot energy prices were estimated for four major inter-regional markets. The inter-regional markets included three which roughly represent defined subregions of the U.S. Western Grid, these being the Northwest Power Pool (exclusive of PacifiCorp), the California-Southern Nevada region, and the Arizona-New Mexico region. Within this representation, the latter also loosely includes the Colorado area exclusive of Tri-State. The fourth inter-regional market includes the MAPP region, which is actually within the eastern U.S. electrical grid.

### **3.4.2 Transmission Constraints and Usage**

Transmission constraints incorporated within the representation are included on Figure 3-3. As mentioned above, this includes a significant constraint of power flow from

Figure 3-3



Area 1, which includes Wyoming, to the PacifiCorp Western Division. The flow of power across these areas is strongly from the east (Area 1) to the west (Area 2), owing to the surplus of generation in the Wyoming-Utah region. The physical capability of this transmission path from East to west is approximately 2,400 megawatts, of which PacifiCorp own approximately 1,600 MW. Similarly, PacifiCorp owns approximately 500 MW of transmission capability between the Area 1 and the Arizona-New Mexico Market, while the transfer capability of this path is approximately 750 MW.

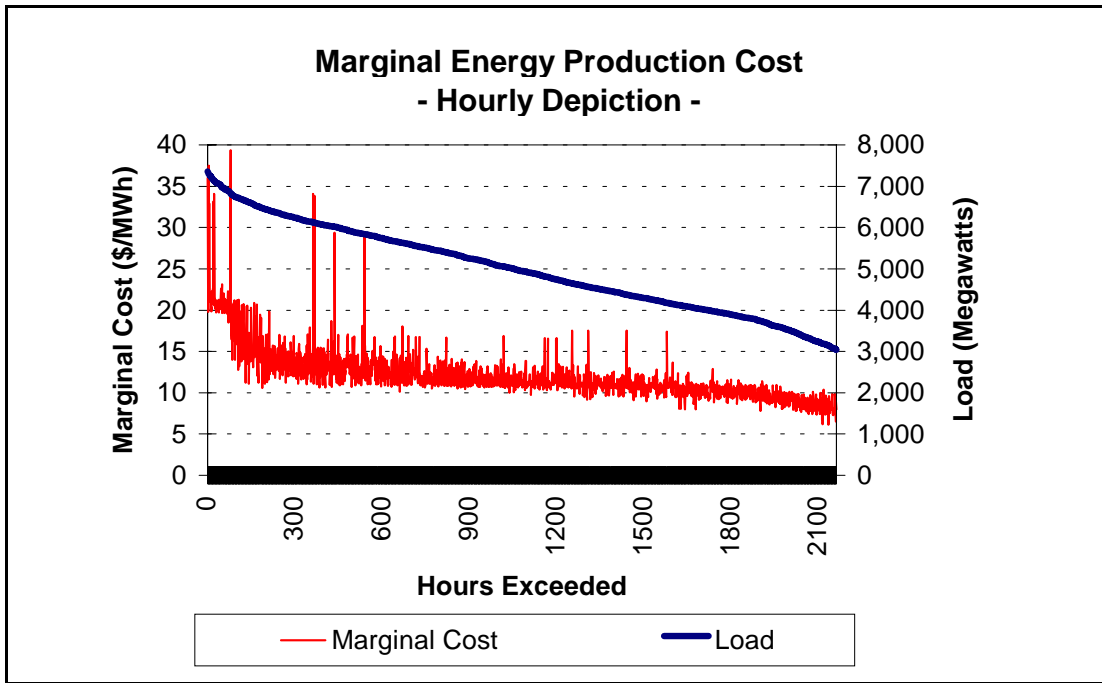
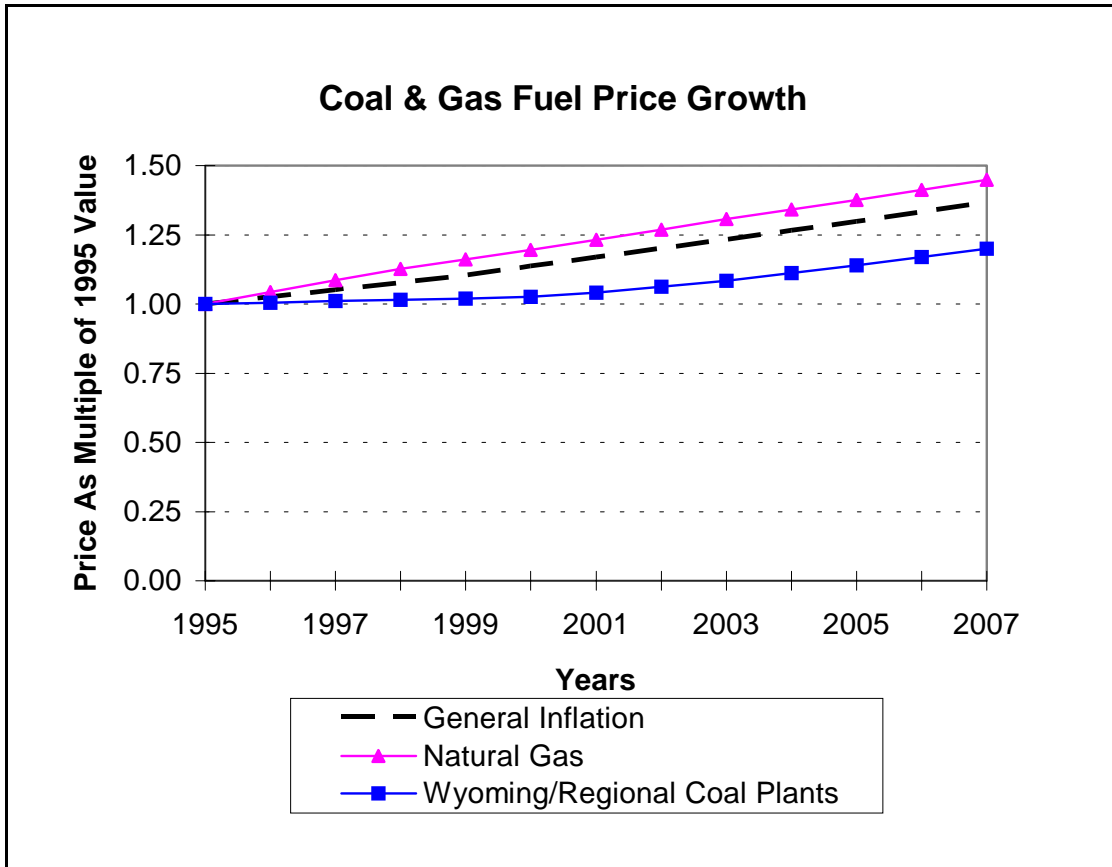
Simulation conducted for the Study indicated that transmission capacity from the Wyoming area to both the west and south are heavily utilized many hours of the year. This result was corroborated by discussions with utility personnel and other available studies.

### ***3.4.3 Forecasted Generation Fuel Prices and Operating Expenses***

The regional electricity supply simulation included a dispatch of generating resources in future years. The primary variables in this simulation are the price of fuel and non-fuel operating expenses at the various generating facilities. Non-fuel expenses of the utilities were generally assumed to increase at the rate of general inflation, assumed in this Study to be 2.6 percent per year.

The economic and fiscal analysis of this Study applies the Wyoming Economic Forecast (WEF), prepared by the Wyoming Department of Economic Analysis (DEA). That document includes forecasts of prices for coal and natural gas indigenous to Wyoming. The WEF coal price escalations represent the overall mixture of coal sold under contract and spot sales of coal. The electric generating plants in Wyoming and the region are primarily served by firm coal contracts, which would not be forecast to de-escalate to the degree reflected in the WEF forecast. Within this Study, current dollar coal prices at the Wyoming and regional coal-fueled plants were projected to remain essentially flat through the year 2000 (which reflects a real price decrease of about 2.6 percent per year). After year 2000, coal fuel prices were assumed to gradually increase, reflecting an inflationary rate by year 2004. The comparative fuel price escalations are illustrated on Figure 3-4A. Natural gas price escalations similar to the WEF values were applied to regional gas-fueled electric generating plants.

Figure 3-4A and 3-4B



#### **3.4.4 Firm Power Transactions and New Generation Capacity**

The participating utilities generally provided information regarding the characteristics and pricing of existing firm power transactions. These assumptions were applied to the modeling of each utility system. No firm power transactions beyond those presently in place were generally provided by the utilities or otherwise assumed in the Study.

Utilities forecasting electric capacity deficits within the Study period generally provided assumptions as to the characteristics and timing of likely new generating capacity. These assumptions were applied in the simulation of each utility system. The first significant capacity deficit was forecast to occur in the year 2002, with the overall region most likely to be deficit in the year 2003.

#### **3.4.5 Inter-Regional Wholesale Power Markets**

Market energy prices were estimated for each inter-regional wholesale power market and applied within the overall utility system representation. Availability of information necessitated that a somewhat unique estimation process be applied to each region.

For Arizona-New Mexico, 1995 actual marginal electric production costs were first examined for the three largest utilities in the region. These costs were examined in hourly patterns as a function of load, to interpret break-points in the cost patterns. Such break-points can verify load levels at which coal-fueled and gas-fueled resources are likely to be operating on the margin. An example of this type of load and cost comparison is shown on Figure 3-4B.

The 1995 Arizona-New Mexico on-peak marginal cost estimates were next compared against the average Palo Verde energy price index for each season of that year. The Palo Verde index represents the average price of electricity sold at and near Palo Verde, Arizona. The comparison indicated that actual price typically exceeded the estimated marginal costs by about \$3 per MWh in each season. This may be due to price mark-up in the spot energy market, as well as the approximate nature of the comparison process.

The Arizona-New Mexico market price forecast then assumed a continuing relationship between marginal costs and prices. The future cost patterns for each time period are assumed to closely follow the fuel prices of the underlying generators estimated to be operating on the margin, with the estimated mark-up assumed to apply. To reflect gradually increasing competitiveness of the wholesale markets as initiated by FERC Order 888, it was generally assumed that the estimated mark-up would be reduced somewhat over the Study period.



However, for California-Nevada and MAPP markets, a specific market index such as Palo Verde does not exist at this time. For these regions, it was assumed that market price is currently typically about \$3 per MWh above estimated marginal energy cost. This mark-up was again assumed to be reduced somewhat over time.

For the Northwest region, the marginal energy costs mentioned above are not available. However, two spot energy price indexes exist for the on-peak hours of this region, the Mid-Columbia index and the California-Oregon Border (COB) index. These indexes were reviewed for years 1995 and 1996. To gain insight and judge reasonableness of a cost-price relationship, this information was evaluated against a regional supply cost curve (similar to a marginal cost curve) available from a utility data base. This information was applied, along with regional load forecasts and typical transaction levels, to estimate marginal costs and prices for future years in a manner similar to that described for the other regions.

#### ***3.4.6 Costs Associated with Embedded Generation Assets***

Investment-related costs were estimated for each system based on investment information provided by the utilities. For the utilities regulated by the Wyoming PSC, the most recent allowed rate of return was generally applied to the utility assets. Tax parameters and other relevant cost-of-service parameters were generally identified from information provided by the participating utilities. Capital investment planned at existing generating plants was generally identified from Integrated Resource Plans (IRPs) and other documents provided by the utilities. Where identified from information provided, regulatory assets were also included in future years.

#### ***3.4.7 Transmission and Distribution Price Component Forecast***

As discussed earlier, the focus of this analysis is the impact of retail electric consumer access to multiple power suppliers. The electric transmission and distribution functions are assumed to remain regulated by State and Federal agencies. As such, it is assumed that the price contributions of these areas are not directly affected by retail access.

A forecast of the transmission and distribution price components is applied within the Study for the sole purpose of estimating the generation component price impact as a percentage of overall price. For this purpose, it is assumed that the transmission and distribution price components increase at the general inflation rate over the Study period. Equivalently stated, these price components are assumed to remain unchanged on a constant dollar basis over the Study period.

### **3.5 Resultant Electric Price Forecasts**

This subsection summarizes the Traditional Industry Scenario electricity price forecasts resulting from explicit analysis of the electric inter-regional electric generation system described earlier, and simplified assumptions regarding escalation of the transmission and distribution functional price components.

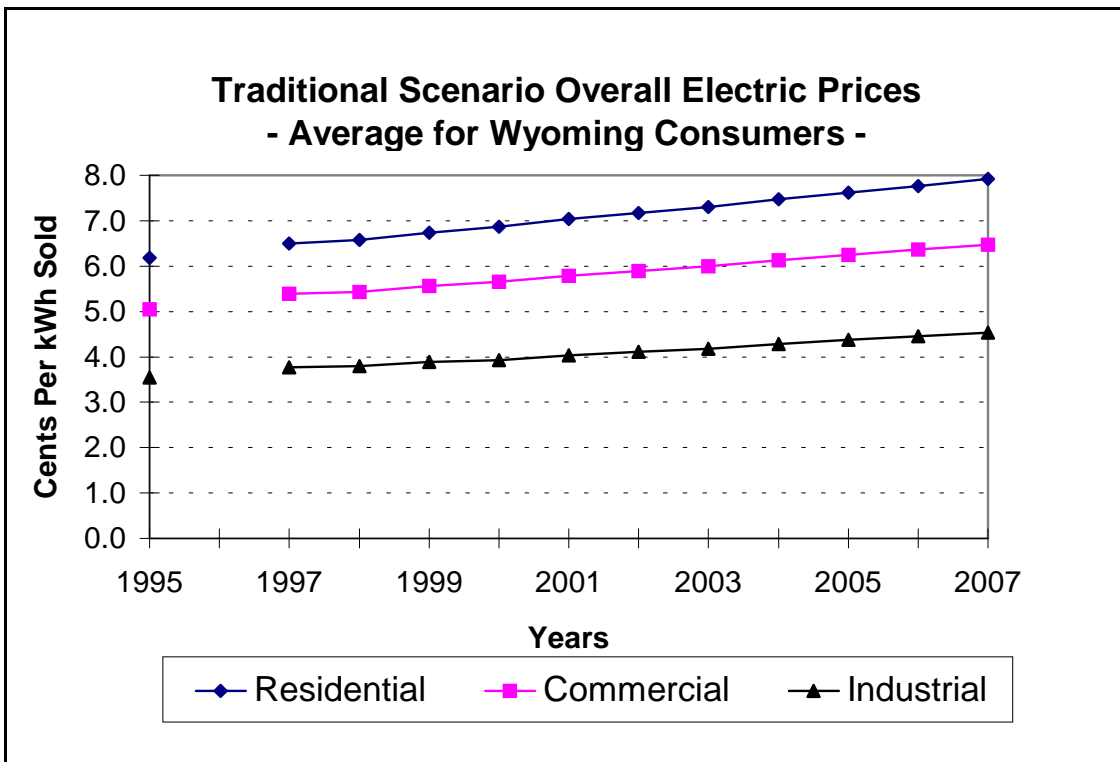
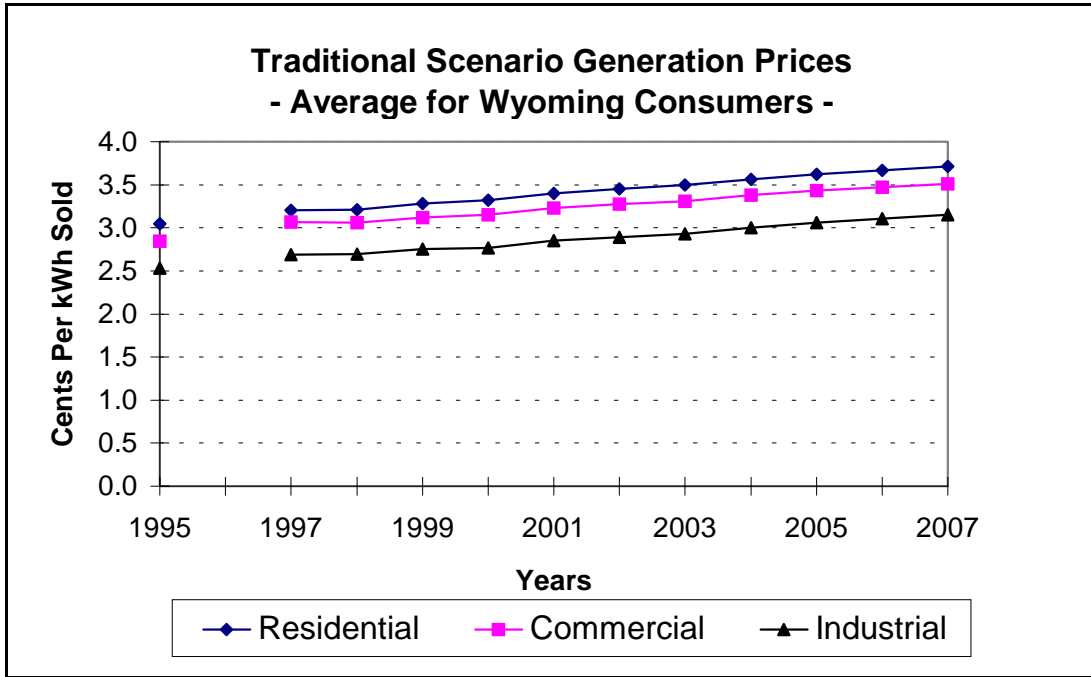
### ***3.5.1 Electric Generation Component Price Forecast***

The state-wide average annual generation component price forecast for each major consumer class resulting from the Traditional Scenario simulation process is illustrated on Figure 3-5A. Also shown are the actual average price values for the year 1995. The forecast reflects average price increases of somewhat less than two percent per year through the Study period. The moderate prices reflected here in comparison to the general inflation rate of 2.6 percent per year are primarily due to the declining (real-dollar) mine-mouth coal fuel prices and the depreciation of existing generating facilities over the Study period. The rates of change are very similar for each of the consumer classes.

### ***3.5.2 Overall Electric Price Forecast by Consumer Class***

An overall Traditional Scenario electricity price forecast was developed for each utility, combining the above generation component price forecast and the simplified transmission and distribution component price forecast discussed above. The resultant average prices for each consumer class in Wyoming are illustrated on Figure 3-5B. Also shown are actual price values for the year 1995. The price forecast contemplates average increases of slightly more than two percent per year over the Study period. The overall prices are again somewhat less than the generation inflation rate of 2.6 percent per year.

### Figures 3-5A and 3-5B



## **4.0 Electric Industry Analysis of Four Restructuring Scenarios**

This section of the report summarizes electric industry analysis conducted for the four restructuring implementation scenarios applied within the Study. A representation of how a competitive electric power generation market may function under retail access was constructed and applied to the Flash-Cut Restructuring scenario, to address impacts on electricity prices and utility stranded costs. The three additional restructuring scenarios, which include phased or partial retail access, were then analyzed as combinations of the Traditional Industry Scenario and Flash-Cut Restructuring scenario. A brief analysis was conducted regarding possible nation-wide electricity price impacts from restructuring, for later application within the economic and fiscal analysis.

Due to the highly uncertain nature of the competitive market price forecasts discussed in this section, sensitivity analysis was conducted addressing a range of possible electricity price impacts. This sensitivity analysis is discussed within Section 7.0 of this report.

### **4.1 Representation of the Flash-Cut Retail Access Scenario**

This subsection discusses the competitive power generation market representation for Wyoming and the surrounding region applied to the Flash-Cut Restructuring scenario.

#### ***4.1.1 The Competitive Generation Market***

The structure and functioning of electric retail access markets is generally in the discussion and early implementation stages in the U.S. As such, the quantification and forecasting of prices in a competitive electricity generation market is uncertain and somewhat a matter of conjecture at the present time. There are only a few examples of mature electricity markets presently operating in a competitive manner anywhere in the world.

The representation of a fully open retail access market applied within the Study assumes a highly competitive market for electric power. It assumed that new suppliers and third-party intermediaries will enter the market and compete vigorously. It is assumed that the competition among suppliers and consumers results in pricing consistent with the marginal cost of production. The competitive market pricing representation applied in the Study is somewhat academic in the sense that it depicts in a straightforward analytical manner what would undoubtedly be a relatively complicated and volatile market process. However, the representation applied here is believed to be the best analytical approach to addressing the operation and performance of a competitive power market within the scope of this Study.

Within this market representation, the overall market price of electric power is constructed of two distinct components: 1) an energy component based on the costs of producing electric energy, and, 2) a capacity component associated with providing adequate power supply reliability. The following subsections briefly describe the representation of these pricing components within the Study.

The initial market representation applied here implicitly assumes that neither generators or consumers of electricity exhibit significant market power to influence the price of electricity. The representation also assumes that all consumers have effectively the same access to the market, either individually or with other through an aggregator.

#### **4.1.2 The Competitive Market Energy Price**

The energy price component assumes a highly competitive spot market or formal market exchange market for electric energy. This is situation, it is assumed that sources of electric generation are effectively bid into the power market on a hourly or ongoing basis. It is assumed that the electric energy market is sufficiently competitive that the last generators dispatched each hour cannot bid a price higher than the variable cost of production, lest these resources be replaced by others at minimally higher price. It is assumed that by means of a formal or informal market process, the price associated with the last increment of energy produced in any hour is recognized as a *market clearing energy price*, which is in turn paid by all consumers.<sup>1</sup> In any given hour, the generators operating below the market clearing energy price will garner revenue above variable cost, in effect providing a margin to help offset fixed costs of ownership.

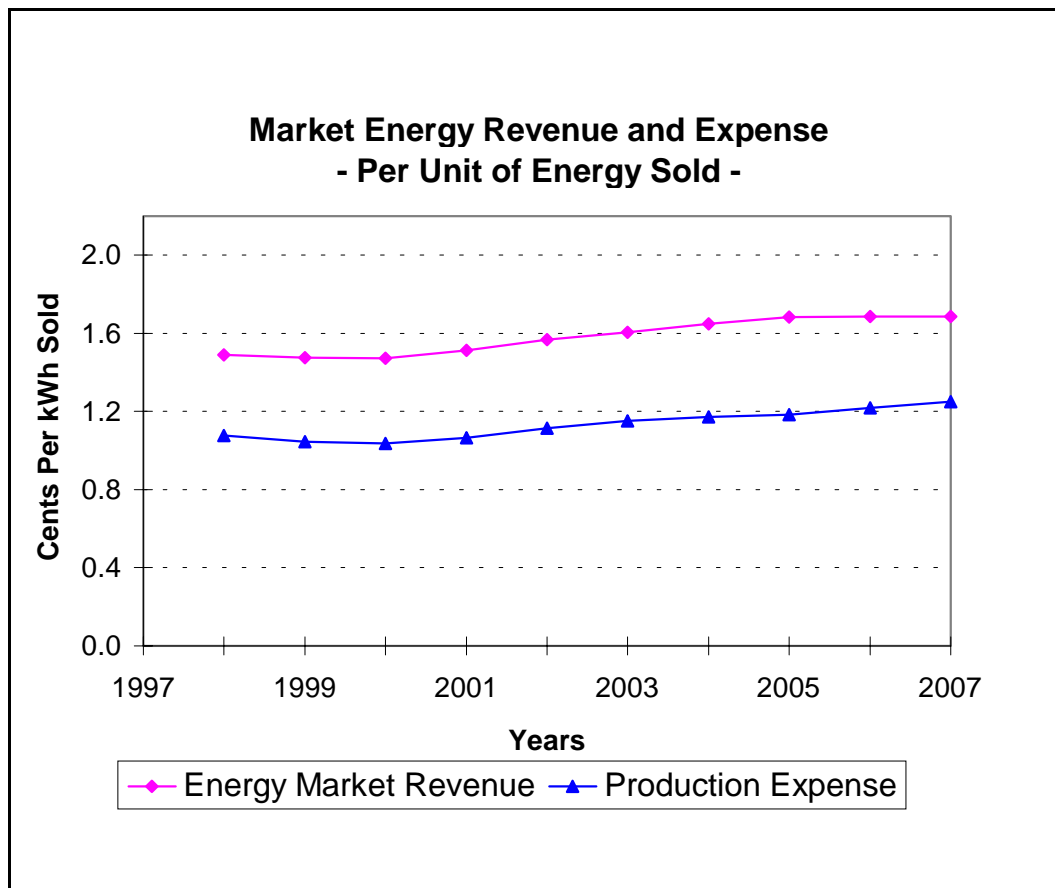
The inter-regional electric power supply system representation described in Section 3.0 was applied to the Flash-Cut restructuring scenario simulation, the major change being that power generation is no longer dedicated to meeting the needs of consumers within specific certified utility service areas. The energy bidding and price simulation applied the same underlying generation sector cost assumptions as previously applied to the Traditional Industry Scenario. This included the generator fuel and non-fuel operating costs and inter-regional market prices discussed within Section 3.0.

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<sup>1</sup>The Black & Veatch power market simulation model assumes that the market clearing prices will effectively include generation no-load costs, in addition to pure incremental production costs.

The dispatch of regional generators resulting from the competitive energy market simulation was quite similar to the Traditional Industry Scenario. A small electric production expense saving resulted from the open market dispatch, although equivalent to less than two percent of overall electric production costs. The average annual market clearing energy prices estimated for the Flash-Cut scenario simulation are illustrated on Figure 4-1, along with the average variable cost of electric production.

**Figure 4-1**



### 4.1.3 The Market Value of Capacity

The value and pricing of electric capacity in a competitive power generation market is presently a matter of significant speculation and debate throughout the U.S. The market representation applied in the Study assumes that electric capacity has intrinsic value, providing reliability of service and reduced price volatility to consumers.

The Study applies a *pure capacity* depiction to estimate the long-run value (price) of electric generating capacity. This depiction assumes that capacity added singularly to improve reliability of supply will operate very few if any hours in a given time period. As such, the generating capacity alternative exhibiting minimum fixed costs is assumed pursued for this purpose. This depiction is generally consistent with marginal cost or value studies often conducted within the electric power industry.

The market representation assumes that prices would fully reflect the marginal value of capacity when sufficient electric capacity is present to provide the reliability expected by the market -- which might be referred to as a balance of market demand and supply. It is assumed that in the long-run, the competitive markets will (at least on average) be in balance. It is assumed that to entice owners of such generation to commit the investment to maintain this balance as demands grow, market prices must be sufficiently high to earn a return on investment comparable to alternative investment opportunities.

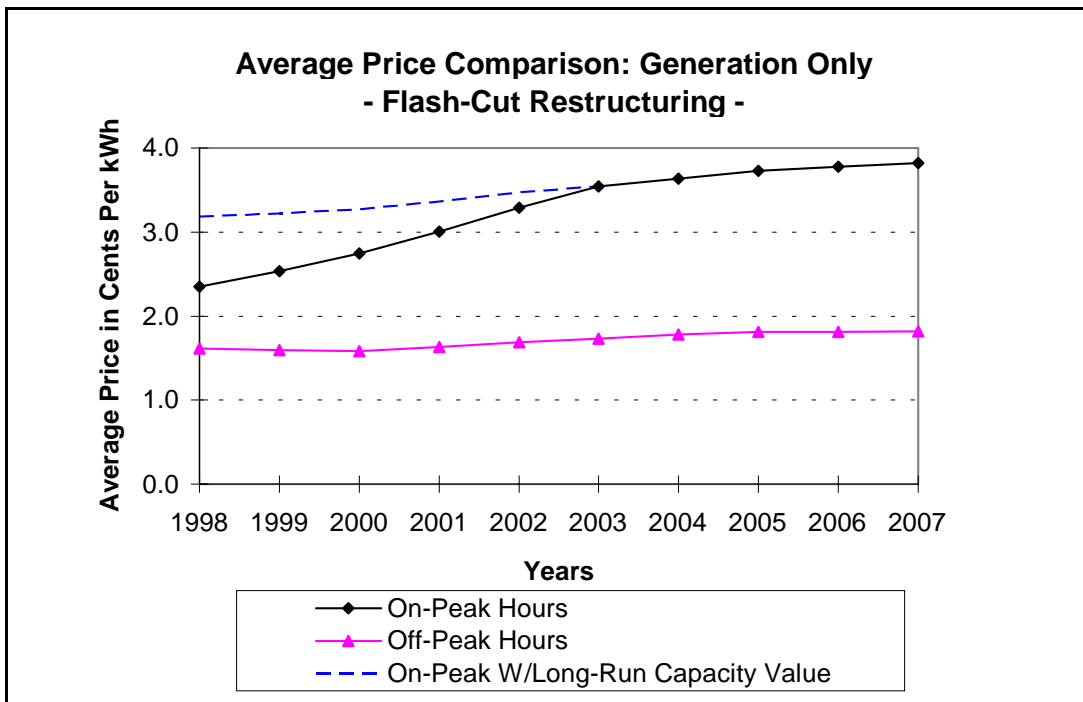
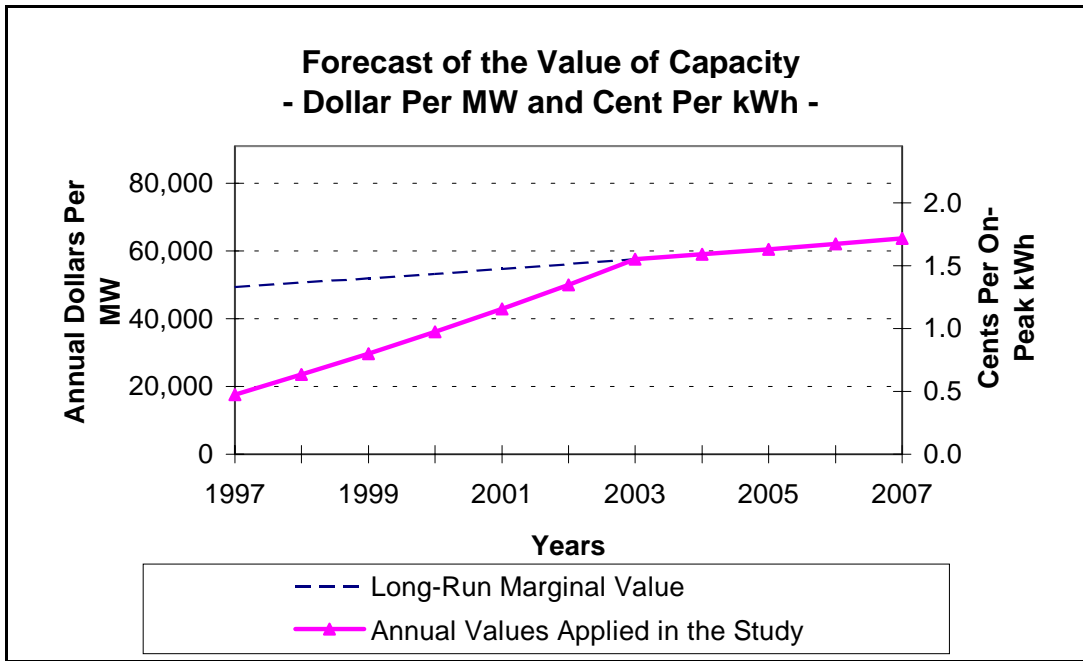
It was assumed that the investment necessary to add pure capacity to the regional system is \$325 per kW in 1997 dollars. It is assumed that pure capacity would most often be represented by a simple-cycle combustion turbine, this being the conventional technology offering the lowest up-front investment per unit of capacity. To estimate the long-run market value of capacity, it was assumed that investors would expect recovery of capital over a 20 year period, and to earn a return on investment of 10 percent. The resultant long-run value of capacity was \$50 per kW in 1997, increasing at the general inflation rate of 2.6 percent annually, as shown on the left-side vertical axis of Figure 4-2A.

The market representation also recognizes that the present capacity surplus situation in the western U.S. results in capacity prices significantly less than the long-run equilibrium<sup>2</sup>. This is assumed in the Study to be a short-term phenomenon, with demand-and-supply equilibrium assumed beginning in the year 2003, when new electric capacity is estimated

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\*\* At present, the installed generating capacity on the western U.S. grid is 125 to 130 percent of the peak consumer demand, while about 115 percent is generally considered adequate for reliability of supply.

**Figures 4-2A and 4-2B**





to be needed in the region. The 1997 short-run value of capacity was estimated to be 36 percent of the long-run price, or about \$18 per kW. The short-run price as a percentage of long-run price was assumed to increase linearly until achieving the long-run value in the year 2003.

#### **4.1.4 Resultant Competitive Market Prices**

For ultimate application to consumer class prices, the value of capacity was assumed to be distributed across the electricity consumed within the on-peak hours of the year. For this purpose, the on-peak and off-peak hours were defined in the same manner as discussed within Section 3.0. The resultant short-run value of capacity assumed within the overall market price was 0.3 cent per kWh in 1997, increasing as shown on the right-side vertical axis of Figure 4-2A.

Combining the market value of energy and the value of capacity as discussed above, the resultant average on-peak and off-peak market energy prices applying to the Flash-Cut Restructuring scenario were as shown on Figure 4-2B. In 1998, the average on-peak value was 2.4 cent per kWh, and the average off-peak value was 1.6 cent per kWh.

## **4.2 Impacts of the Flash-Cut Retail Access Scenario**

The market pricing results for the Flash-Cut scenario were reviewed as to impact on both consumers and the electric utilities, as summarized in the following subsections.

### **4.2.1 Consumer Class Price Impacts Prior to Stranded Cost Recovery**

The power generation market prices discussed above were estimated for each consumer class, based on class loads shapes for each month of the year. Consistent with the representation of a purely competitive market, it was assumed that in any given hour, the same market energy price would be paid by each consumer class. The average price paid by each consumer class is dependent on the pattern of loads. Residential consumers experience a higher proportion of energy needs during the high load (on-peak) hours than do other classes, resulting in a higher average price. By definition, the electricity price impacts discussed in this subsection are prior to recovery of stranded costs by the electric utilities. As discussed in Section 2.0 and in the next subsection, concurrent recovery of stranded costs could largely or fully offset the price reductions during a transition pricing period to a restructured market.

The cost-of-service for electric power transmission and distribution functions were assumed unaffected by the retail electric restructuring. These price components were quantified as discussed in Section 3.0 and added to the power generation component price forecasts to arrive at an overall price of electricity for each consumer class. The resultant

electricity prices identified for the Flash-Cut Restructuring scenario were compared to the Traditional Industry scenario prices discussed in Section 3.0.

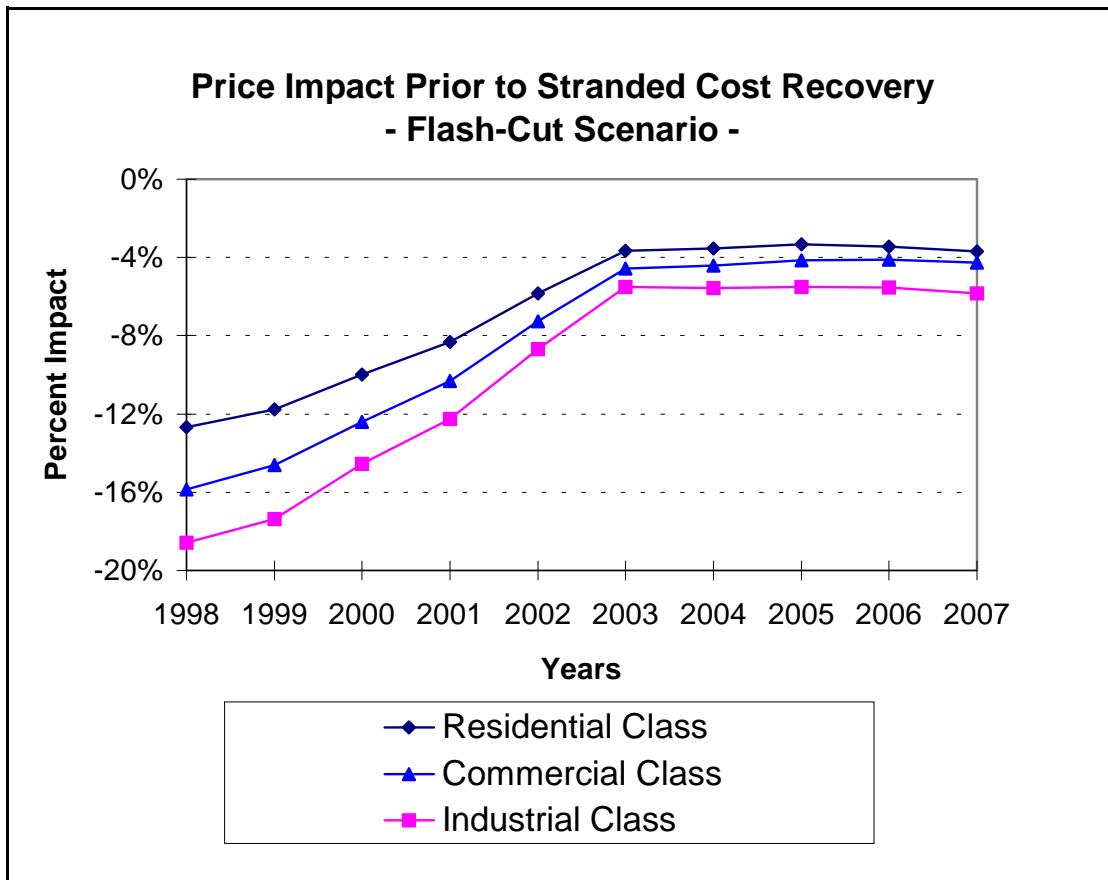
Estimated the state-wide average electricity price impacts of the Flash-cut restructuring scenario prior to stranded utility cost recovery are illustrated for each consumer class on Figure 4-3 and summarized in Table 4-1. The first year (1998) price reductions averaged 16 percent across all consumer classes. The average price reductions to industrial consumers were somewhat greater than for commercial and residential consumers. The price reductions in succeeding years were progressively lower as the market prices increased to long-run equilibrium, which was assumed to occur in year 2003. The electricity price impacts for each consumer class were then relatively consistent over the remaining years of the Study.

Table 4-1 State-Wide Average Price Impacts for the Flash-Cut Scenario <sup>[1]</sup> (Average Annual Percentage Impact)				
	Residential	Commercial	Industrial	All Class
Short-Run Market Price - 1998-2002	-9.7	-12.1	-14.3	-12.3
Long-Run Market Price - 1998-2002 <sup>[2]</sup>	-4.7	-5.5	-6.3	-5.5
- 2003-2007	-3.5	-4.3	-5.6	-4.8

<sup>[1]</sup> Prior to recovery of utility stranded costs.  
<sup>[2]</sup> The long-run market price impacts are calculated in years 1998-2002 only for the purpose of later economic and fiscal analysis.

As discussed in Section 3.0, the prices of electricity offered to consumers in Wyoming vary by as much as 30 percent across all the utilities serving Wyoming. Consumers served by the highest priced utilities will experience the greatest benefit from a competitive power generation market. In the Flash-Cut Restructuring scenario, consumers presently served by the highest priced utilities experienced a first year price reduction of averaging 27 percent (again prior to stranded cost recovery), and a 19 percent long-run price reduction.

Figure 4-3



For application to the follow-on economic analysis, the electricity price impacts were also analyzed assuming the long-run value of capacity in all years of the Study. This analysis indicated the long-run price impacts would generally be consistent over time, decreasing slightly in the later years, as also summarized in Table 4-1.

#### 4.2.2 Utility Stranded Cost Impacts

For purposes of this Study, the stranded utility costs of each restructuring scenario were defined as the amount of annual revenue lost by utilities in comparison to the Traditional Industry Scenario, less any estimated fuel savings and other operating efficiencies resulting from an open market regional generator dispatch. Projected revenue requirements above market value for future generating capacity of the Traditional Industry Scenario were also excluded from stranded costs.

The analysis of specific opportunities to mitigate stranded costs, such as asset securitization or power purchase contract renegotiations, was beyond the scope of this Study. As such, the stranded utility costs presented here are similar to but somewhat less than the underlying change in electricity prices. Assuming mitigation methods could reduce stranded cost exposure, the remaining stranded costs would be less than the values presented in this Study.

The overall estimated stranded costs as a percentage of Traditional Scenario prices for all utilities serving Wyoming are illustrated on Figure 4-4A. The stranded costs were estimated to be 15 percent of the Traditional Scenario revenues in the first year (1998). In succeeding years, the stranded cost percentages were progressively less, as market prices were assumed to transition to long-run values.

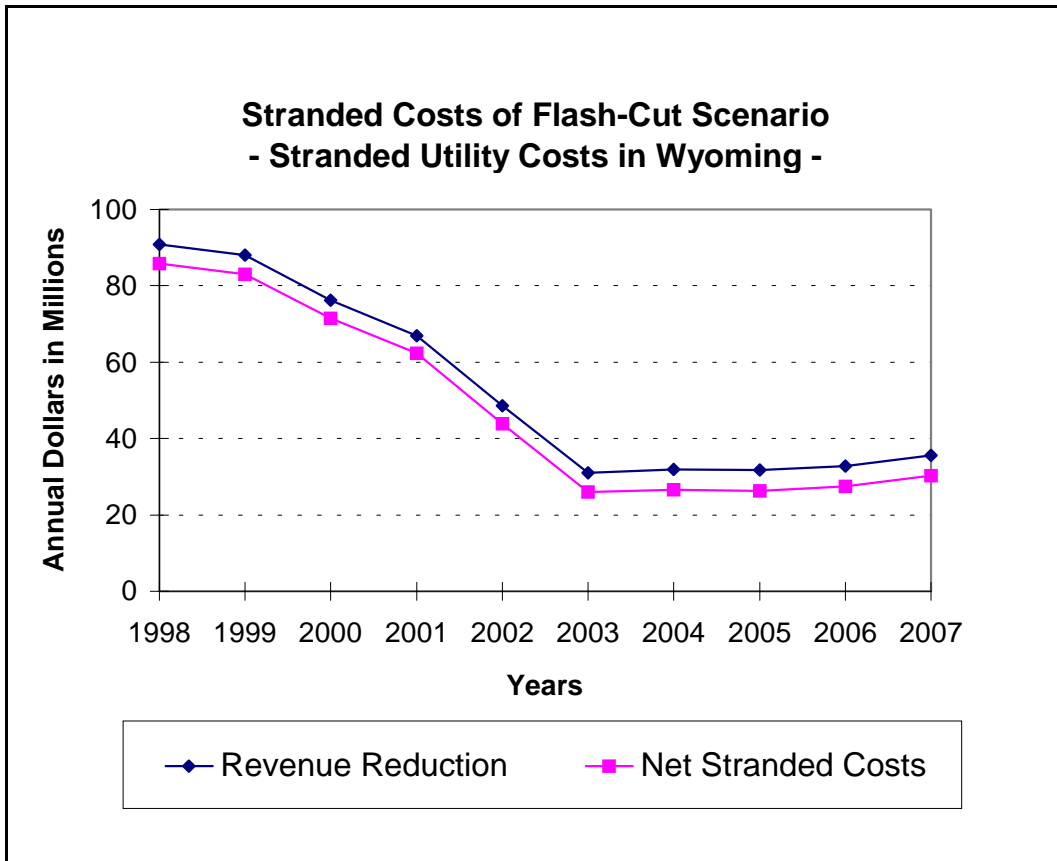
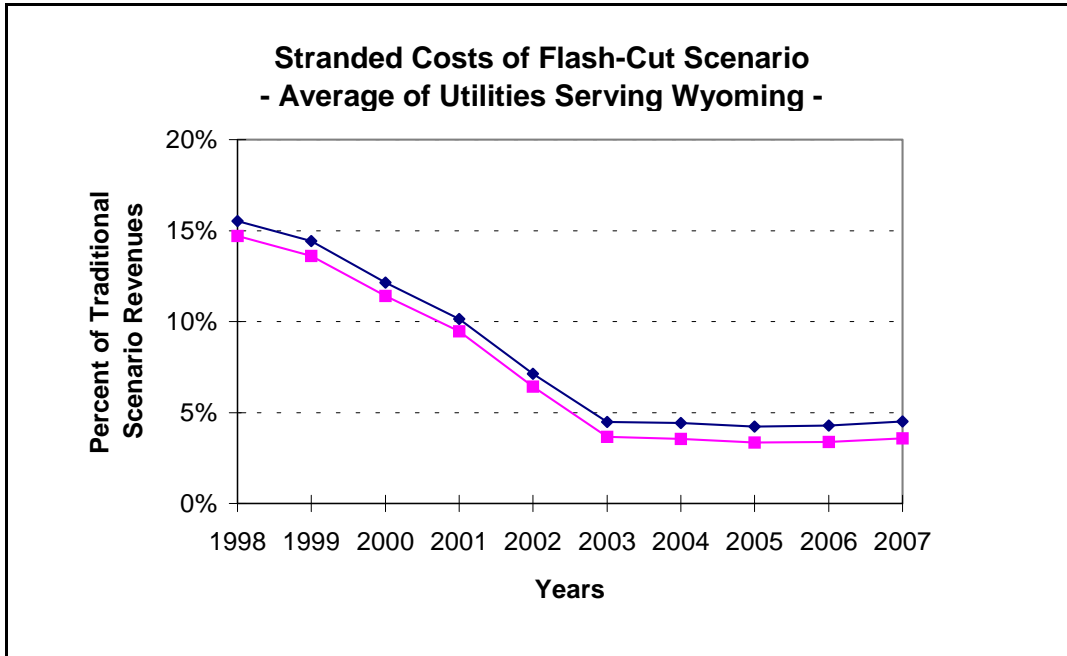
Based on in-state electricity sales, the estimated stranded costs in Wyoming applying to all utilities under the Flash-Cut scenario are illustrated on Figure 4-4B. The first year (1998) stranded costs were estimated to be \$86 million. When long-run market price equilibrium is achieved in year 2003, the estimated stranded costs average about \$27 million per year.

Based on the above analysis, the state-wide average surcharge associated with recovery of stranded costs would be about 0.7 cent per kWh in the first year, again prior to consideration of cost mitigation. When the long-run market equilibrium is reached in year 2003, the average surcharge would be roughly 0.2 cent per kWh through the Study period.

### **4.3 Impacts of the Alternate Restructuring Scenarios**

Restructuring scenarios 2 through 4 summarized in Section 2.0 represent phased or partial implementation of retail consumer access to multiple electricity suppliers. As such, these scenarios were analyzed as combinations of the two primary scenarios addressed earlier -- the Traditional Industry Scenario and the Flash-Cut Restructuring scenario. This analysis assumed that a partially competitive power generation market can operate as efficiently as a fully competitive market, and that there would be no large shift of cost burdens in a partially regulated electricity market.

### Figures 4-4A and 4-4B



Comparative price impacts and utility stranded cost impacts quantified for the phased and partial restructuring scenarios are discussed within the following subsections. This information is also illustrated on Figures 4-5A and 4-5B, and summarized in Table 4-2.

#### ***4.3.1 Impacts of Phased Retail Access (Scenario 2)***

Under the Phased Access scenario, retail access in Wyoming and other states is assumed to be phased in, such that all consumers are eligible for participation in year 2001. The Phased Access scenario reduces electricity price impacts in early years of the Study broadly proportional to the portion of the market eligible for retail access each year. The electricity price impacts of this scenario peaked in the first year of full retail access (2001), exhibiting an 11 percent price reduction when averaged across all consumer classes, as summarized on Figure 4-5A. After the phase-in, the electricity price reductions are identical to those for the Flash-Cut scenario.

Stranded costs of the Phased Access scenario are summarized in comparison to the other retail access scenarios on Figure 4-5B. Stranded costs of the Phased Access Scenario would peak in year 2001, concurrent with full phase in of retail access. The stranded utility costs in that year were estimated to be \$63 million, in comparison to a peak year (1998) impact of \$86 million for the Flash-Cut scenario.

#### ***4.3.2 Impacts of Large Industrial Retail Access (Scenario 3)***

Under this restructuring scenario, only large industrial consumers with electric loads exceeding 1,000 kW are eligible for retail access in Wyoming and other states, with all consumers in this subclass being eligible in year 1998.

Large industrial electricity sales in Wyoming represent about 23 percent of overall electricity sales. As such, the aggregate electricity price and revenue impacts of this scenario are constrained in comparison to the previous scenarios. The price impacts of this scenario are limited to the industrial consumer class. The price impacts within the industrial class are broadly proportional to the electricity sales represented by the participating consumers. Industrial consumer sites with loads exceeding 1,000 kW represent approximately one-third of industrial energy sales in the State. As such, the overall industrial consumer class price reductions of this scenario are roughly one-third of those observed for the Flash-Cut scenario, averaging seven percent in the first year and slightly more than two percent in the long-run.

## Figures 4-5A and 4-5B

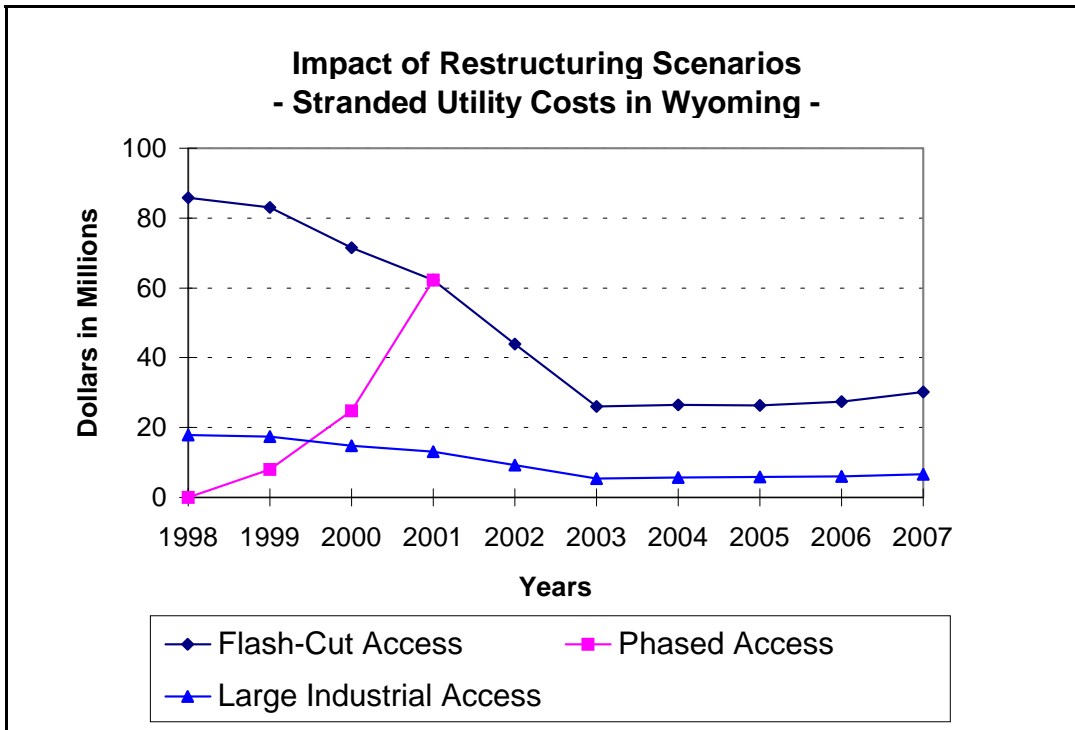
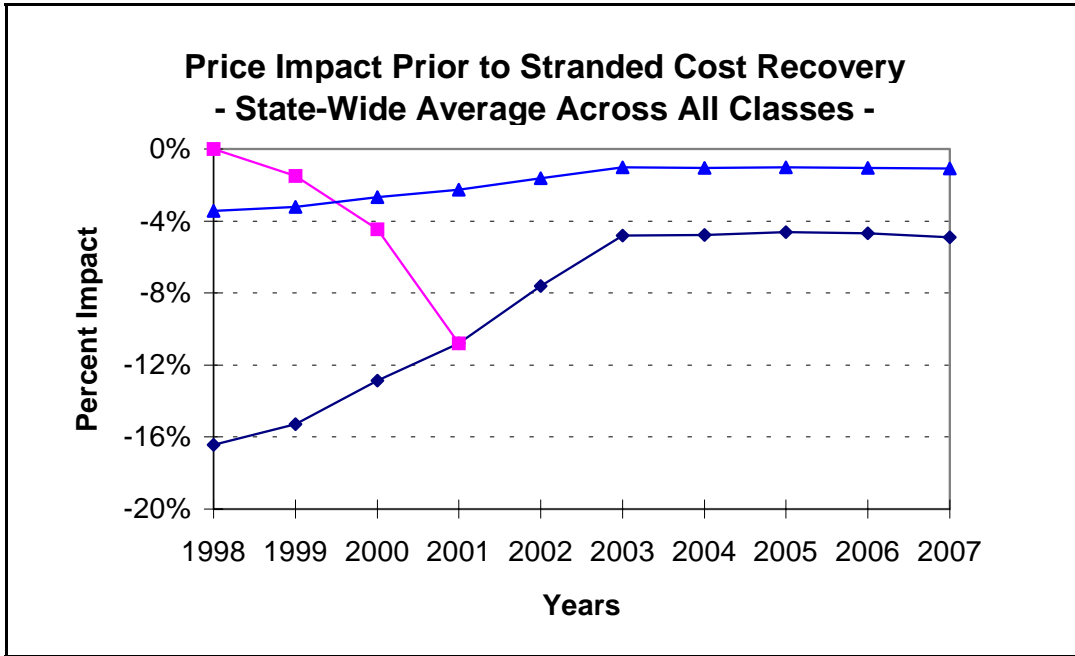


Table 4-2 State-Wide Average Electricity Price Impacts for Scenarios 1 thru 4 <sup>[1]</sup> (Average Annual Percentage Impact)				
Scenario	Residential	Commercial	Industrial	All Class
<u>Flash-Cut Access</u>				
Short-Run Market Prices				
- 1998-2002	-9.7	-12.1	-14.3	-12.3
Long-Run Market Prices				
- 1998-2002	-4.7	-5.5	-6.3	-5.5
- 2003-2007 <sup>[2]</sup>	-3.5	-4.3	-5.6	-4.8
<u>Phased Access</u>				
Short-Run Market Prices				
- 1998-2002	-3.6	-4.4	-5.8	-4.9
Long-Run Market Prices				
- 1998-2002	-2.2	-2.7	-3.3	-2.9
- 2003-2007 <sup>[2]</sup>	-3.5	-4.3	-5.6	-4.8
<u>Industrial Access</u>				
Short-Run Market Prices				
- 1998-2002	0.0	0.0	-5.3	-2.7
Long-Run Market Prices				
- 1998-2002	0.0	0.0	-2.3	-1.2
- 2003-2007 <sup>[2]</sup>	0.0	0.0	-2.1	-1.1
<u>Non-Participation</u>	No Impact on Wyoming Prices			
<sup>[1]</sup> Prior to recovery of utility stranded costs.				
<sup>[2]</sup> The long-run market price impacts are calculated in years 1998-2002 only for the purpose of later economic and fiscal analysis.				

### 4.3.3 Impacts of Non-Participation in Wyoming (Scenario 4)

Within this scenario, Wyoming is assumed to be the only state choosing not to participate in electric restructuring. All other states are assumed to implement retail access consistent with the Flash-Cut scenario. The Study assumes within this scenario that electric prices in Wyoming are unchanged from the Traditional Scenario. No indirect price effects were identified which would be any more likely to increase price than to decrease price in this situation.



Since Wyoming is alone in declining retail access participation within this scenario, the State will lose some of its price advantage, to the extent the remainder of the U.S experiences price reductions from restructuring. This is further illustrated in the next subsection.

#### **4.4 Analysis of Nation-Wide Electric Price Impacts**

The impact of electric restructuring on electricity prices throughout the U.S. was not a direct subject of this Study. However, the economic analysis applied in Section 5.0 includes the impact of nation-wide electricity price effects on the economy of Wyoming. For this reason, a brief analysis was conducted addressing the potential impact of electric restructuring on nation-wide average electricity prices. The U.S. price impact analysis was conducted in a manner broadly similar to that conducted for the Wyoming/inter-regional electric supply system, although much more simplified. The price impacts were viewed only from a long-term price perspective, for application within the follow-on economic analysis.

Nation-wide average electric prices by consumer class for year 1995 were obtained from a U.S. Energy Information Agency report. Unbundled price information for the generation, transmission and distribution functions are not available from this or any other published source. To estimate the electric generation function price component nation-wide, associated expense and investment information was drawn from an industry database. This information indicated that the electric generation function represents roughly 53 percent of the overall price of electricity nation-wide.

For the Flash-Cut Restructuring scenario, a simplified analysis of market clearing energy price was applied, based on electricity marginal production cost information reported by U.S. utilities and related assumptions. The long-run value of electric capacity assumed in the earlier inter-regional market analysis was applied here. The resultant estimate of restructured prices and price reductions are summarized in comparison to the Wyoming Impacts in Table 4-3. The U.S. price impacts were estimated to be two-to-three times greater than the Wyoming price impacts on a percentage basis, with the overall average price reduction across all consumer classes estimated to be 11 percent.

Table 4-3 Comparative Summary of U.S. Price Impacts for the Flash-Cut Restructuring <sup>[1]</sup> (Percentages)				
	Residential	Commercial	Industrial	Average
Avg Price Impact <sup>[2]</sup>				
- U.S. Overall	-9.3	-10.1	-15.5	-11.1
- State of Wyoming	-4.1	- 4.6	- 6.0	- 5.2
Wyo. Price Advantage <sup>[3]</sup>				
- Before Restructuring	29	36	26	30
- After Restructuring	24	30	18	24
<sup>[1]</sup> Prior to recovery of stranded utility costs. <sup>[2]</sup> The U.S. price impact is static across all years; Wyo. impact listed is the long-run average over the 10 year Study period. <sup>[3]</sup> Based on an even-weighted mix of consumer class sales.				

Also listed on Table 4-3 are the state-wide average percentage price advantages in Wyoming in comparison to the U.S. overall, both before and after the Flash-Cut electric restructuring. As shown, the electricity price advantage in Wyoming relative to the U.S. overall would remain quite strong, despite the greater price reductions assumed nation-wide.

The overall U.S. price impacts of Restructuring Scenarios 2 through 4 were evaluated as combinations of the Traditional Scenario and the Flash-Cut scenario, as had been done for the Wyoming analysis. The resultant patterns of price impact for the U.S. overall were consistent with those for the Wyoming impact analysis.

## 5.0 Baseline Economic and Fiscal Trends

Wyoming policy-makers interested in the past, present and future of Wyoming's economy focus on the Wyoming Economic Forecast (WEF) prepared by the State Division of Economic Analysis in the Department of Administration and Information. The WEF tracks all the major industrial sectors and emphasizes Wyoming's important basic industries: mining, agriculture and tourism—the latter reflected mostly in the state's retail and service businesses. In combination with projected mineral prices and tax rate assumptions, the WEF is a key input for preparation of the Wyoming Revenue Forecast by the Consensus Revenue Estimating Group (CREG), which reports periodically to the governor and the state legislature.

As a documented portrayal of current expectations regarding Wyoming's economic and fiscal future, the Wyoming economic and revenue forecasts provide a stable point of reference or "Baseline" for evaluating the relative significance of predicted economic or fiscal impacts of electric industry restructuring alternatives.

Wyoming's current official economic forecast extends through 2005 and the current official revenue forecast extends through 2003. For this assessment, both forecasts have been extended through 2007, to match the ten-year period for assessment of electric utility restructuring options. The extensions have been prepared in collaboration with the Wyoming Division of Economic Analysis, but are not official. As mentioned, they are intended to provide a Baseline for evaluating the projected impacts of electric industry restructuring *relative* to Wyoming's overall economy and revenue base.

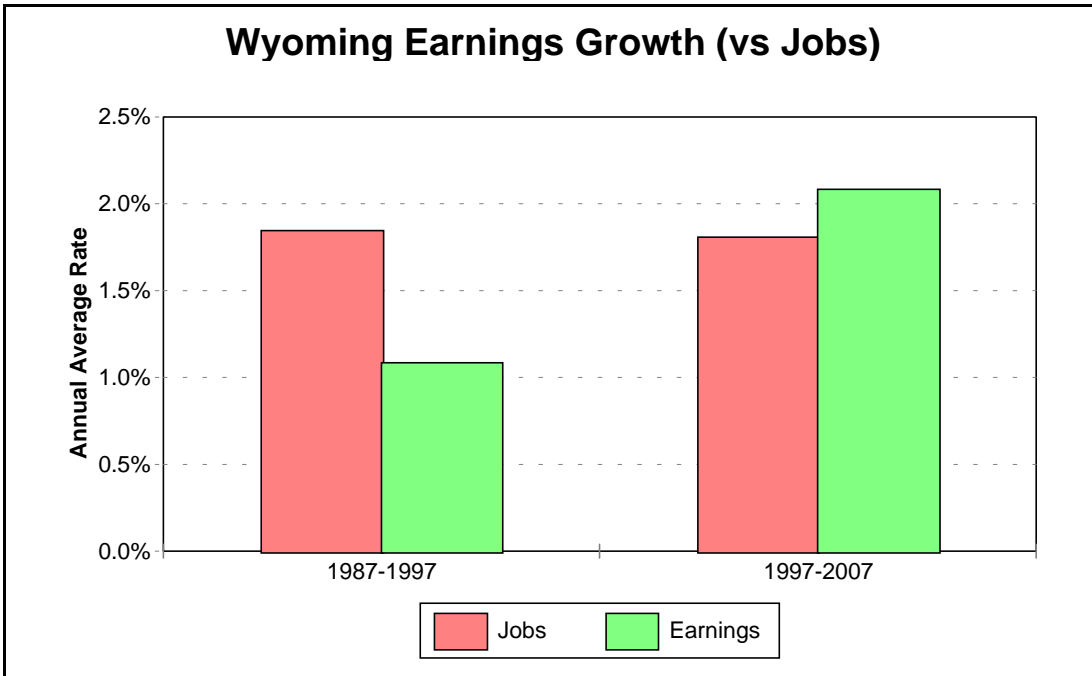
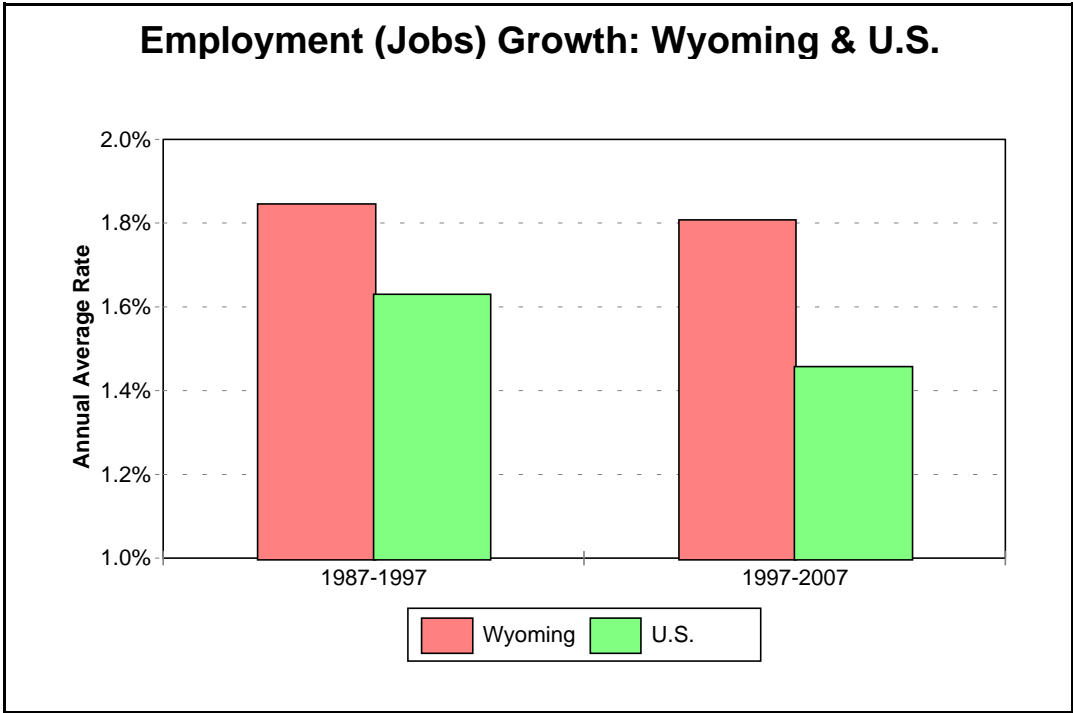
### 5.1 The Baseline Wyoming Economy

Economic trends are usually described in terms of employment (jobs), earnings, population and income. This presentation considers Baseline trends in two 10-year periods: the past decade (1987-1997) and the upcoming decade (1997-2007). Wyoming jobs growth is compared with that in the nation. Wyoming employment earnings and population are compared with changes in jobs. Per capita income changes are compared with those in the nation as a whole.

#### 5.1.1 Employment: Full and Part-Time Jobs (Figure 5-1A)

Full and part-time jobs in Wyoming increased from 261,400 in 1987 to about 313,900 in 1997. This represents an average annual increase of 1.85 percent, slightly above the rate of increase in the nation as a whole (1.63 percent). Four industry

Figures 5-1A and 5-1B



sectors account for almost all (93 percent) of the increase in Wyoming jobs between 1987 and 1997-- services (41.0 percent), retail trade (28.3 percent), construction (12.2 percent) and state and local government (11.5 percent). While Wyoming mining production has increased since 1987 (coal 7.4 percent annually; natural gas 5.7 percent annually), production efficiency resulted in small decreases in mining jobs. Two other traditionally important sectors of the Wyoming economy, agriculture and federal government (civilian and military), also suffered small decreases in jobs over the past decade.

Baseline trends suggest that Wyoming jobs will increase to 375,650 by 2007. This represents an average rate of increase of 1.81 percent, significantly above the rate of increase projected for the nation as a whole (1.46 percent). Job increases are expected to be more broadly distributed than in the decade past. The four sectors that dominated recent jobs growth (services, retail trade, construction, state and local government) account for 78.7 percent of expected jobs growth. These, plus finance, insurance and real estate (7.1 percent), manufacturing and wholesale trade (6.9 percent) account for almost all (93 percent) of the state's expected jobs growth.

By 2007, the services, retail trade and construction sectors are expected to provide over half (53.3 percent) of Wyoming jobs, up from 43.56 percent in 1987. By contrast, agriculture, mining, transportation and public utilities, and government (federal, state and local) sectors which provided over two-fifths (41.1 percent) of Wyoming jobs in 1987, are expected to provide less than a third (31.6 percent) in 2007.

### **5.1.2 Employment Earnings (Figure 5-1B)**

In the past decade, Wyoming earnings lagged well behind jobs—increasing at an annual rate of 1.08 percent in constant dollar terms, compared to jobs increases of 1.85 percent. The slower increase in earnings is attributable to the increasing share of retail, service and other generally lower paying jobs in the Wyoming economy, and perhaps to the general pressures on salaries and wages in the US economy.

The Baseline forecast suggests that earnings will increase faster than jobs in the upcoming decade at an annual rate of 2.08 percent compared with the 1.81 percent annual increase forecast for jobs. Reversing the trend of the past decade, average earnings in Wyoming is expected to increase (by about 0.27 percent annually) though not as rapidly as in the nation as a whole (0.85 percent).

### **5.1.3 Resident Population (Figure 5-2A)**

Resident population in Wyoming has increased much slower than jobs over the past decade by about 0.31 percent compared with the 1.85 annual increase in jobs. Increases in labor force participation (particularly among females) and multiple job holding (reflecting the increasing availability of part-time jobs in many industries) explain how increases in jobs may not be matched by corresponding increases in population.

Baseline trends suggest that Wyoming population will increase more rapidly between 1997 and 2007 (annual rate of 0.94 percent), but will still lag behind growth in jobs (1.81 percent). These trends reflect the same factors -- changes in employment composition, average earnings, multiple job holding and labor force participation -- which resulted in lower population than jobs growth over the past ten-year period.

### **5.1.4 Per Capita Income (Figure 5-2B)**

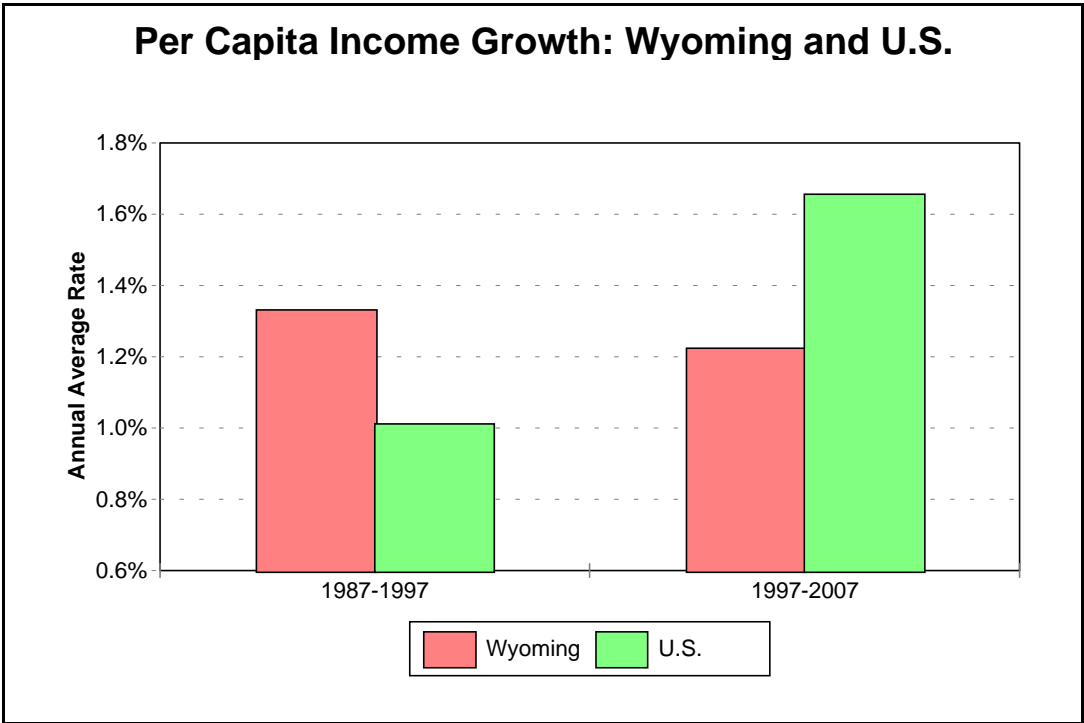
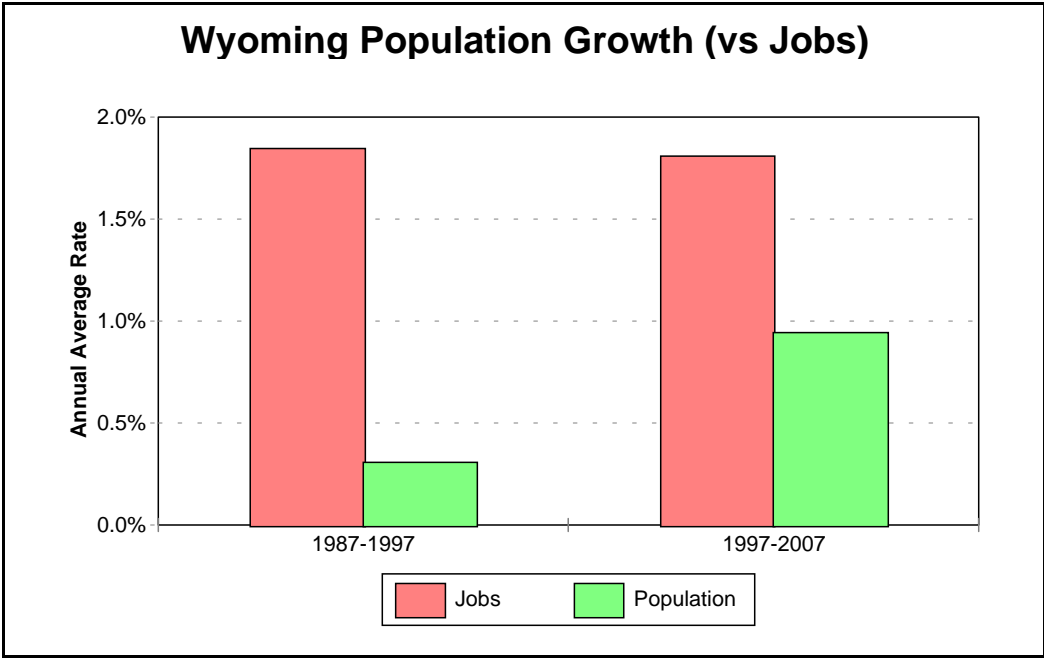
Per capita income in Wyoming increased at an average annual rate of 1.33 percent between 1987 and 1997, exceeding the US rate in real terms (1.01 percent). However, this relationship is forecasted to reverse between 1997 and 2007, when per capita income is expected to increase at a 1.22 percent rate in Wyoming versus a 1.66 percent rate in the nation as a whole.

The Baseline forecast indicates that increases in Wyoming employment earnings (2.08 percent annually, in constant dollar terms) and non-earnings income (2.34 percent annually) will exceed increases in population (0.94 percent annually).

### **5.1.5 The Economic Context for Electric Utility Restructuring**

What sort of economic context for electric utility restructuring is indicated by the Baseline economic forecast? The picture is a growing economy generally outperforming the national economy in terms of job growth, but an economy lagging behind the nation in terms of average earnings and per capita income. The job increases are in sectors (e.g., retail and services) which provide relatively low-paying often part-time jobs, filled by a workforce with more female workers and more multiple job holders and with an increasing reliance on non-earnings sources of income. The Baseline forecast is one which includes significant growth accompanied by stresses for both households and employers.

Figures 5-2A and 5-2B



## 5.2 The Wyoming Revenue Baseline

As a point of reference for the assessment of electric industry restructuring, projections of revenues collected from Wyoming's severance tax, federal mineral royalty payments, sales and use taxes and ad valorem taxes have been extended through 2007. These Baseline trends are then applied (in Section 6.0) to place the impacts of electric utility restructuring in proper context. We first briefly review the Wyoming tax base, then present the Baseline revenue projection and relate projected revenues to measures of the underlying Wyoming economy.

### 5.2.1 The Current Wyoming Tax Base

Wyoming's major revenue sources are the mineral severance tax, federal mineral royalties, sales and use taxes and ad valorem taxes. Together, these sources generated over \$1.1 billion in 1996 -- monies which supported the state general fund, secondary and higher education, highways and road improvements and municipal government.<sup>1</sup>

Wyoming's tax base is heavily resource-dependent. All severance taxes (\$204 million in 1996) and federal mineral royalties (\$176 million in 1996)<sup>2</sup> are derived directly from mining activity. Of sales and use taxes (\$290 million<sup>3</sup> in 1996) about 9.2 percent is derived from mining activity directly, and about 4.6 percent<sup>4</sup> is mining related. Of ad valorem taxes (\$450 million in 1996)<sup>5</sup> about 56.9 percent is derived from mining activities directly, and about 11.4 percent is mining related.<sup>6</sup> Overall, about 56.7 percent of the state's tax base is derived directly from mining activity, and another 5.6 percent is mining related.

Of the total tax revenues from the above sources, about \$271 million (24.2 percent) supports the state general fund, about \$403 million (35.9 percent) supports secondary and higher education, about \$264 million (23.6 percent) supports local government and special

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<sup>1</sup>Another major revenue source in Wyoming is the interest income payments (from PWMTF and pooled funds). However, the four major revenues mentioned above account for a very large portion (perhaps 95 percent) of the tax base for Wyoming state and municipal government and special districts.

<sup>2</sup>This estimate excludes bonus revenues from coal leases on federal lands.

<sup>3</sup>This estimate excludes revenues from local option sales and use taxes.

<sup>4</sup>Estimated at 50 percent of collections from the construction, manufacturing and transportation sectors.

<sup>5</sup>All ad valorem revenues from required levies and local options—7.006 percent of total statewide assessed valuation.

<sup>6</sup>PIC review of 1996 valuation of a) locally-assessed real property, b) locally assessed personal property, c) state assessed property, and d) mineral production.



districts, about \$88 million (7.9 percent) supports highway and water projects and about \$94 million (8.4 percent) supports interest payments and other activities.

A substantial portion of Wyoming's mineral production is used for conversion to electricity, either in or outside the state. Based on national statistics, almost 90 percent of Wyoming's coal (which accounts for 36.1 percent of total mineral valuation ) and 12 to 15 percent of Wyoming's natural gas (which accounts for 23.6 percent of mineral valuation) is consumed in conversion to electricity.

The implications of electric utility restructuring for Wyoming's state-local revenues thus become clear: Any changes in the demand for Wyoming minerals used for conversion to electricity could have significant effects (positive or negative) on the state's tax base and on the state agency, education, municipal infrastructure development activities it supports.

### **5.2.2 Baseline Revenue Projections (Figure 5-3A and 5-3B)**

Projected revenues reflect the overall projections for the Wyoming economy as well as assumptions regarding mineral prices and tax rates. Assumptions regarding mineral prices are consistent with those used in Wyoming's CREG forecasts. It is assumed that coal prices will decline from about \$6.23 per ton in 1996 to \$5.50 in 2002, remaining stable thereafter; that natural gas prices will increase from \$1.20 per mcf in 1996 to about \$1.30 in 1998, remaining stable thereafter; that crude oil prices will decline from about \$18.40 per barrel in 1996 to \$15 in 1998; and that trona prices will increase from about \$44 per ton in 1996 to \$46.40 in 2003, remaining stable thereafter.

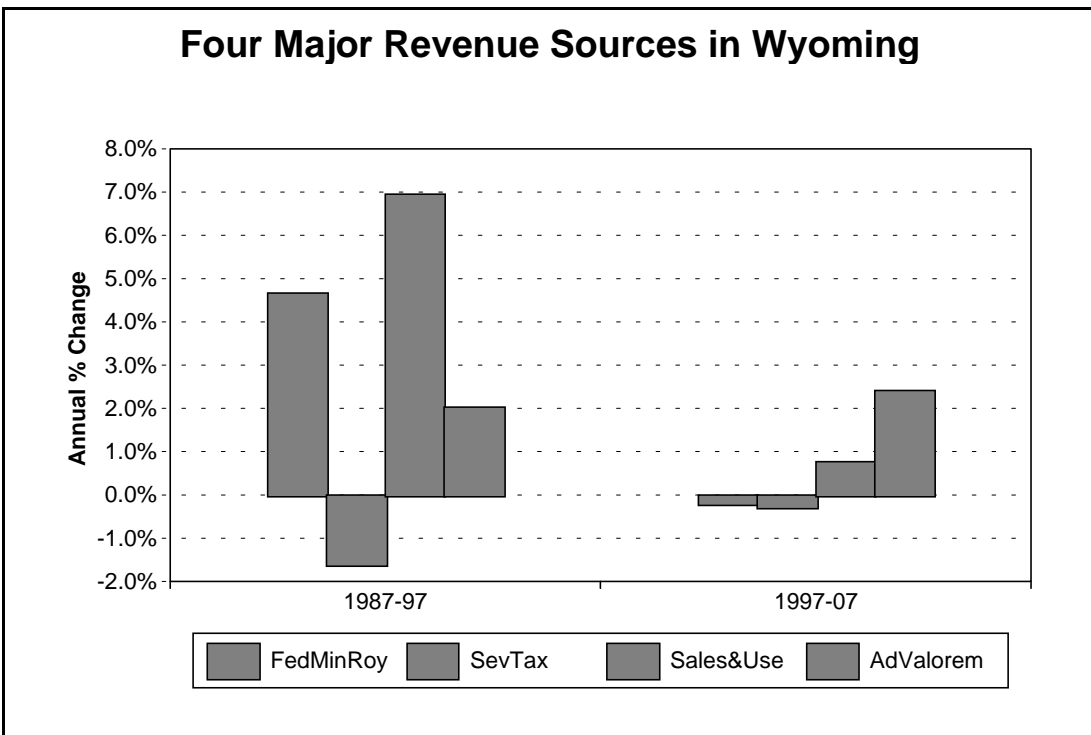
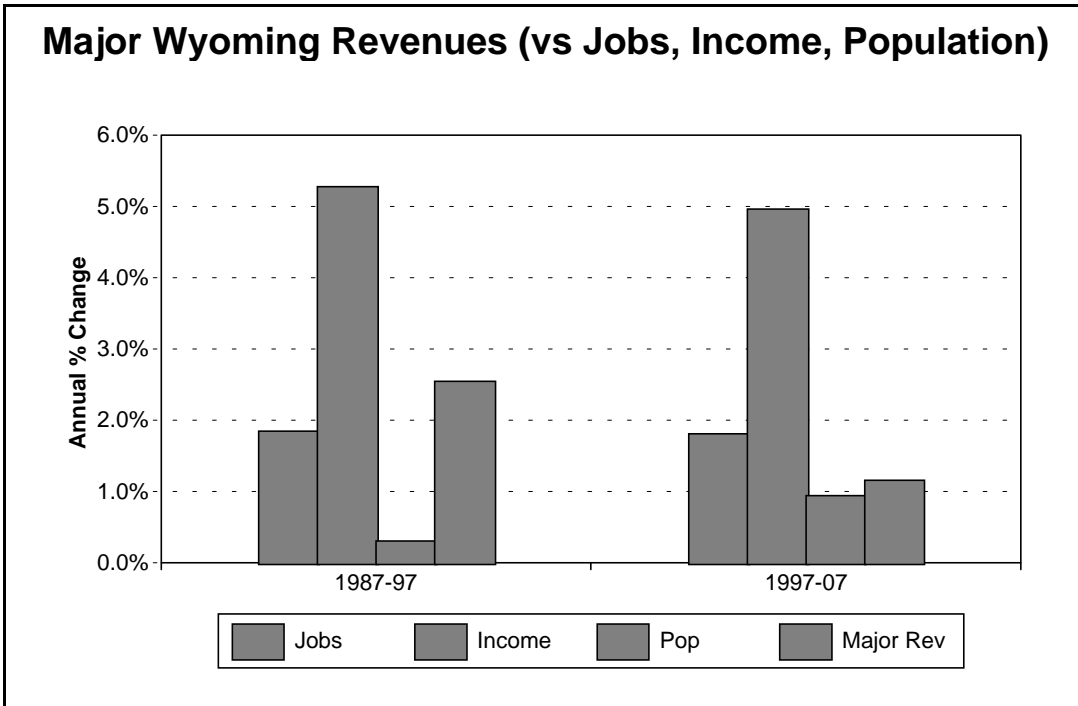
If mineral prices exceed those assumed in our projections, the effect would be to increase the Baseline projection of tax revenues and reduce the percentage effect of a given electric restructuring impact.

The Baseline revenue projections assume that tax rates (collections as a percentage of the revenue base) remain constant, with one exception: Wyoming's four percent sales and use tax rate, which was recently extended through 2002 by the Wyoming legislature, is assumed to drop to three percent after 2002.

Given these assumptions, the projections for Wyoming's major revenue resources (in current dollar terms) are as follows:

- **Severance tax collections** would decline from about \$221 million in 1997 to about \$214 million in 2007. After declining at a 1.6 percent annual rate between 1987 and 1997, severance taxes would decline at a slower 0.3 percent annual rate between 1997 and 2007.

## Figures 5-3A and 5-3B



- The state share of **federal mineral royalties** would decline from about \$191 million in 1997 to about \$188 million in 2007. After increasing at a 4.7 percent annual rate over the past decade, federal mineral royalties would decline at a 0.2 percent annual rate over the upcoming 10-year period.
- **Sales and use tax collections** would increase from about \$300 million in 1997 to about \$323 million in 2007. After increasing at a 7.0 percent annual rate over the past decade, sales and use tax collections would increase at a 3.2 percent annual rate through 2002 (after which the tax rate drops from 4 percent to 3 percent), and at a 3.5 percent annual rate thereafter.
- **Ad valorem tax revenues** (assuming an average combined mill levy consistent with that in 1996) would increase from about \$494 million to \$627 million between 1997 and 2007. Ad valorem tax revenues would increase somewhat more rapidly (2.4 percent annually) in the upcoming decade than in the past decade (2.0 percent).
- Revenues from the **four major sources** would increase at an annual rate of 1.2 percent over the upcoming decade. This rate of increase is much lower than that projected for personal income (just under 5.0 percent, in current dollar terms) and lower than that projected for jobs (1.81 percent), but slightly above projected rate of increase in resident population (0.94 percent).

What fiscal context for electric utility restructuring is suggested by the above projections? The projections indicate tight fiscal conditions for state and local agencies. While major revenue collections will increase a bit more rapidly than resident population, inflation will sap some of the purchasing power of projected revenues. Also, the service demands on public agencies are driven by increasing jobs (projected to increase at a 1.8 percent annual rate) as well as increases in population. Under the projections, major public revenues would represent a steadily declining share of the state's wealth, as measured by personal income or the value of production.

As a context for impact analysis, the Baseline revenue projections represent a conservatively low Baseline, which increases the percentage effect of a given impact. Should mining production or mining prices exceed expectations, or should tax rates (e.g., sales, ad valorem) be adjusted upwards, revenues would be increased, thus reducing the percentage effect of a given impact. In the meantime, the conservatively low Baseline projections suggest a fiscal context in which state and local agencies have limited fiscal capacity to absorb and ameliorate negative fiscal impacts resulting from electric utility restructuring or other economic development or policy change.

### 5.3 The Distribution of Wyoming Economic Activity

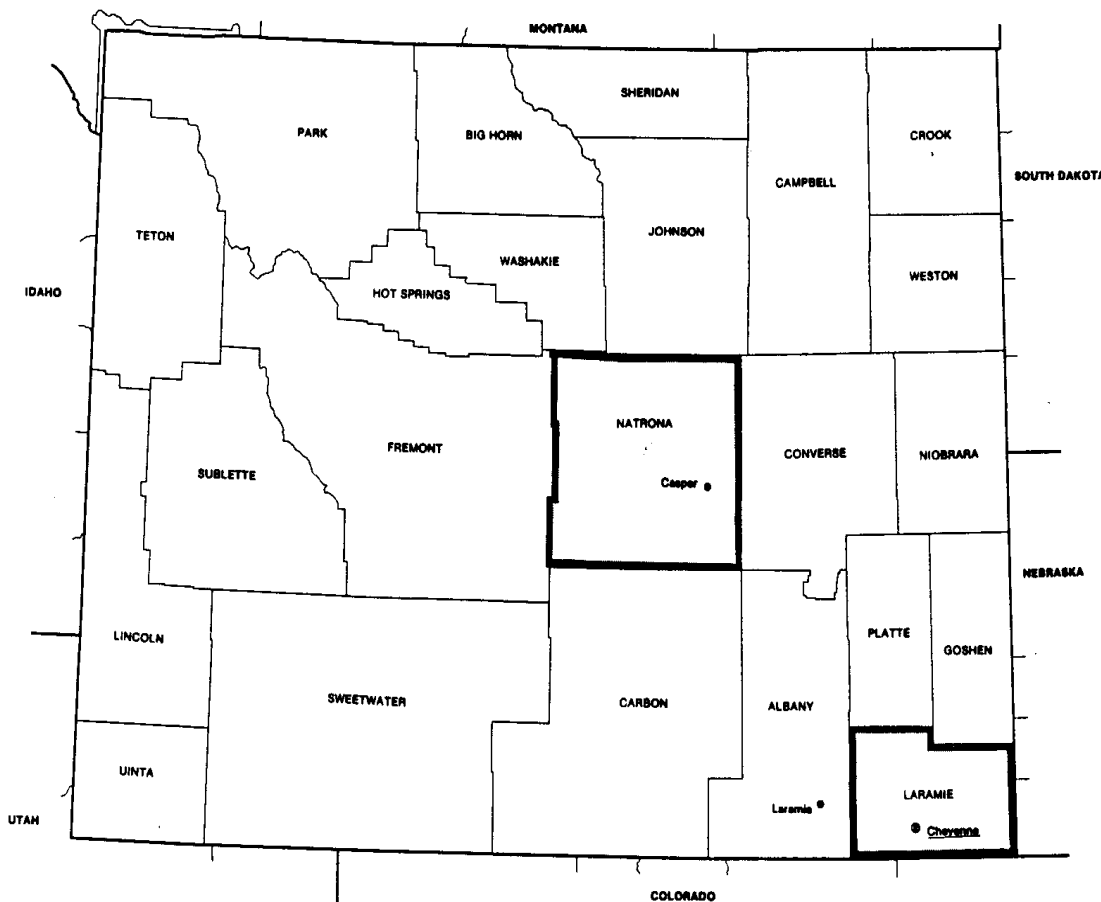
This assessment focuses on the potential impacts of electric utility restructuring on the State of Wyoming as a whole, not on the various subareas of the state. Nevertheless, it is important to keep in mind that Wyoming's economic activities are unevenly distributed across the state; therefore statewide impacts could affect some subareas more than or differently than others. At the same time, Wyoming's state-local revenue structure has taken the uneven distribution into account, and moderates the fiscal impact of economic changes affecting particular subareas in extremely positive or negative ways.

A review of the 1996 Annual Report of the Wyoming Department of Revenue and the 1996 Equity State Almanac provide some measures of the uneven distribution of economic activity within the state of Wyoming:

- Over half (54.2 percent) of Wyoming's mineral production value is produced in two counties—Campbell (35.7 percent) and Sweetwater (18.5 percent).
- 92.2 percent of Wyoming's coal production value is generated in three counties: Campbell (76.3 percent), Sweetwater (9.4 percent) and Lincoln (6.5 percent). Coal accounts for over one-third (36.1 percent) of total mining production valuation in the state.
- Over half (52.6 percent) of Wyoming's oil production value is generated in four counties: Campbell (23.4 percent), Park (13.6 percent), Uinta (8.4 percent) and Sweetwater (7.2 percent). Oil accounts for almost one-third (31.7 percent) of total mining production value in the state.
- Eighty percent of Wyoming's natural gas production value is produced in five counties: Sweetwater (23.9 percent), Uinta (16.3 percent), Lincoln (14.3 percent), Sublette (14.0 percent) and Carbon (11.4 percent). Natural gas accounts for about one-quarter (23.6 percent) of total mining production value in the state.
- One-hundred percent of Wyoming's trona production is generated in western Sweetwater County. Trona accounts for 7.2 percent of total mining production value in the state.
- Almost two-fifths (38.1 percent) of Wyoming's population resides in the urban areas of three counties: Laramie/Cheyenne (16.4 percent), Natrona/Casper (13.3 percent), and Sweetwater/Rock Springs-Green River (8.4 percent).
- Close to half (44.8 percent) of the state's residential and commercial property valuation is in three counties: Teton (19.2 percent), Laramie (15.7 percent) and Natrona (10.0 percent). Seasonal population and high-priced property account for the discrepancy between Teton's share of the state's residential and commercial property valuation (19.2 percent) and its share of residential population (2.8 percent).

- Over one-third (33.6 percent) of the state's irrigated farmland valuation is in just three counties: Bighorn (11.5 percent), Park (11.4 percent) and Goshen (10.7 percent).
- Almost three-quarters (74.0 percent) of the state's refineries valuation is in two counties: Uinta (37.0 percent) and Lincoln (36.7 percent). Of the state's manufacturing and industrial valuation, refineries account for 29.4 percent, mining for 56.6 percent, all other manufacturing for but 14.0 percent.
- Almost three-fifths (57.2 percent) of Wyoming's land area is public lands, but public land is much more dominant in some counties (e.g., Teton: 99.1 percent, Bighorn: 93.8 percent) than in others (e.g., Goshen: 8.6 percent, Laramie: 10.6 percent).

**Figure 5-4**  
**Wyoming Counties and Major Cities**



## **6.0 Economic and Fiscal Analysis of the Four Restructuring Scenarios**

Sections 3.0 and 4.0 describe an analysis of Wyoming's electric utility industry and the changes in electricity prices projected under four restructuring scenarios defined by the Steering Committee. The results of each scenario are expressed as expected changes in electricity prices in Wyoming and in the rest of the nation. Given the changes in electricity prices, this section describes the consequent effects on the state's economy and its major revenue sources. The economic changes in Wyoming reflect both the electricity price impacts in Wyoming, and the effects of changes in electricity prices elsewhere in the U.S.

The economic analysis applied a REMI socioeconomic model discussed in Section 2.0. The fiscal analysis applied a version of the Consensus Revenue Estimating Group (CREG) process mentioned in Section 5.0 to project major Wyoming revenues, but with adaptations of REMI economic impact measures as drivers of key portions of the Wyoming revenue base. Impacts for the dollar value of mining sector output (distributed between coal and natural gas) were applied as the driver for impacts on revenues from severance taxes, the state share of federal mineral royalties, and the mineral value portion of assessed valuation. Earnings in the mining sector was applied as the driver for use tax revenues. Total personal income was applied as the driver for sales tax revenues.

### **6.1 "Flash-Cut" Retail Access**

The "Flash-Cut" electric restructuring scenario assumes that electricity markets are fully competitive beginning in 1998 for all customer classes in Wyoming and the rest of the country. As presented in Section 4.0, the electric industry analysis indicates that such policies would result in rather small reductions in electricity prices for Wyoming customers, accompanied by larger average reductions in the rest of the country. The price reductions would be a savings for Wyoming customers, which could be spent productively for other purposes. However, Wyoming's electricity price advantage over the rest of the country would be reduced somewhat.

#### **6.1.1 Overall Economic Impacts**

The economic analysis of Flash-Cut Restructuring (Scenario 1) are illustrated on Figure 6-1A, indicating that the overall impact on the Wyoming economy would be positive but small, and perhaps not even discernable in the context of other possible changes in markets,

taxes, interest rates, federal resource policies and other economic factors over the next decade.

The economic analysis indicates that electricity price changes under the Flash-Cut scenario would result in initial increases in jobs (about 0.5 percent) and personal income (about 0.4 percent), but that these effects would dissipate over the early years of the forecast period, as Federal Reserve policies to moderate inflation and unemployment have their effects. The estimates suggest that the positive economic effects of reduced electricity prices in Wyoming and the positive effects of reduced electricity prices nationwide (stimulating improvements in the national economy and markets for Wyoming exports) outweigh any possible negative economic effects of the reduced Wyoming advantage in terms of electricity prices versus the rest of the country.

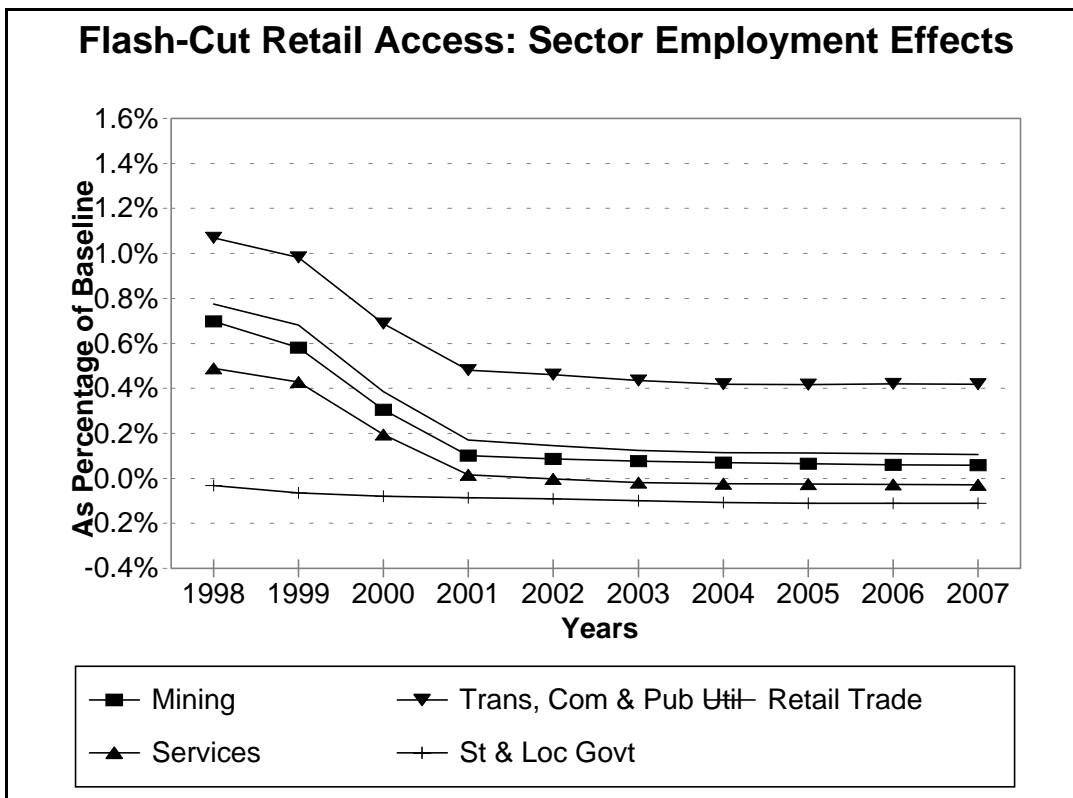
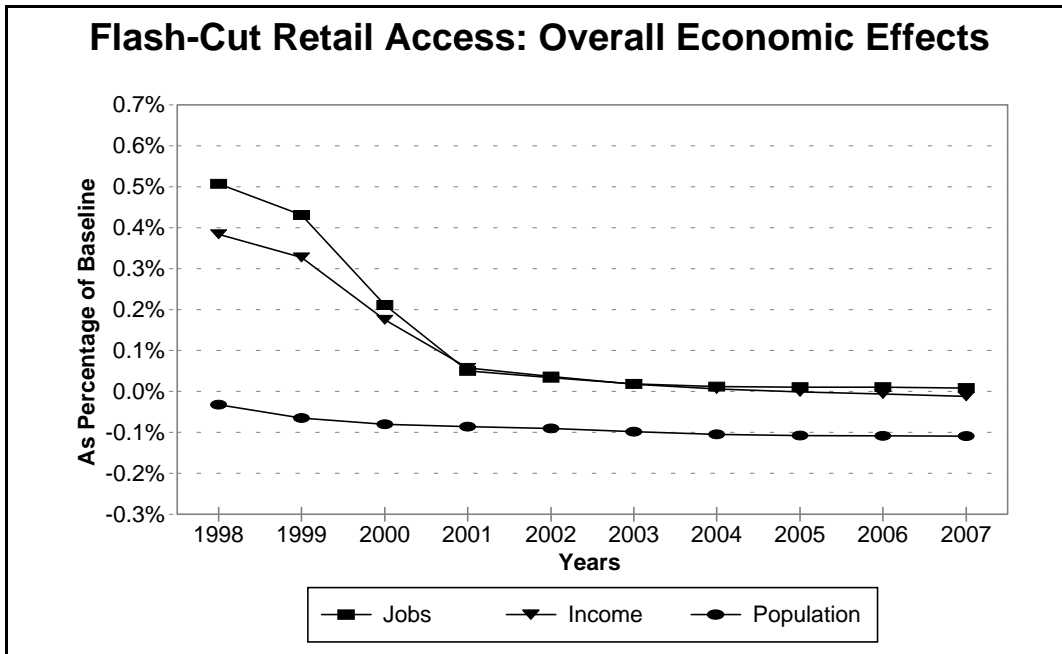
The economic analysis indicates that while electricity price changes under the Flash-Cut scenario would result in small initial increases in jobs and personal income, they could result in very small percentage reductions (about 0.1 percent) in projected resident population—suggesting that the price changes of the Flash-Cut scenario could lead to a bit more economically-motivated out-migration and/or a bit less economically-motivated in-migration than would occur under the baseline projection.

### ***6.1.2 Impacts for Wyoming Economic Sectors***

The economic analysis indicates that the electricity price changes under the Flash-Cut scenario would result in small but almost negligible changes in the composition of Wyoming's economy, as summarized below and illustrated on Figure 6-1B:

- Employment in Wyoming's transportation, communications, and public utilities (TCPU) sector would grow just a little more quickly under the Flash-Cut scenario than under the Baseline (an average annual rate of 0.83 percent per year versus 0.80 percent for the Baseline forecast).
- State and local government employment would grow a little more slowly under the Flash-Cut scenario than under the Baseline (an average annual rate of 0.92 percent versus 0.93 percent for the Baseline forecast). The predicted change in growth of state and local government sector employment is apparently correlated to the predicted change in growth of population.
- Mining employment would grow just slightly more quickly under the Flash-Cut scenario than under the Baseline (an average annual rate of 0.68 percent per year for Flash-Cut scenario versus 0.67 percent for the Baseline).

Figure 6-1A and 6-1B





- Retail trade employment would grow slightly more quickly under the Flash-Cut scenario than under the Baseline (an average annual rate of 2.25 percent per year versus 2.24 percent for the Baseline).
- Services employment would grow at an average annual rate of about 2.41 percent under both the Flash-Cut scenario and the Baseline.
- The growth outlook for the farm and ranch sectors as a whole would be unaffected by the Flash-Cut scenario, although farm and ranch operations would benefit directly from lower electricity prices.

### **6.1.3 Impacts for Wyoming Revenue**

The Flash-Cut scenario for electric utility restructuring would have very small but positive effects on revenues from four major Wyoming revenue sources as illustrated in Figures 6-2A and 6-2B. Compared to the Baseline projections, the Flash-Cut scenario would increase revenues by almost 0.5 percent in (fiscal year) 1999, declining rapidly to less than 0.1 percent by 2002. The impact of the Flash-Cut scenario on revenues is consistently greater than its impact on personal income or resident population. For example, 1999 impacts are 0.5 percent for revenues versus 0.3 percent for income and -0.1 percent for resident population. Among the four major revenue sources, the impacts are greater for the severance tax and federal mineral royalties (0.8 percent or above in 1999) than for sales and use taxes or ad valorem taxes (about 0.3 percent in 1999). In sum, given its estimated effects on electricity prices in Wyoming and the rest of the nation, the Flash-Cut scenario would have a small but positive effect on Wyoming's major revenue sources.

## **6.2 Phased Retail Access (Scenario 2)**

The Phased Retail Access restructuring scenario assumes that electricity markets are fully competitive for all customer classes in Wyoming and the rest of the nation, but are phased in so that the full effects are not felt until 2001. Results of the economic and fiscal analysis for the Phased Access scenario and the other restructuring scenarios are summarized in Table 6-1.

### **6.2.1 Overall Economic Impacts**

The Economic analysis of the Phased Retail Access scenario indicates that overall impact on the Wyoming economy would be positive but small -- smaller than under the Flash-Cut scenario -- with impacts delayed from 1998 and 1999 (in the Flash-Cut scenario) to 2000 and 2001. Though positive, the impacts might not be discernable in the context of other possible economic changes over the coming decade.

Figure 6-2A and 6-2B

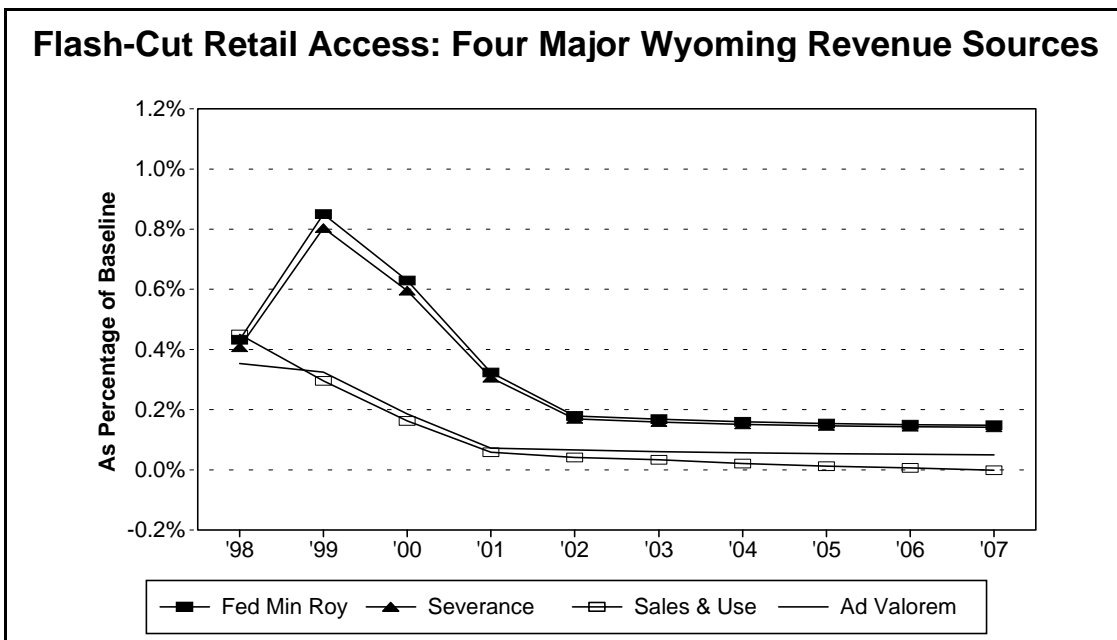
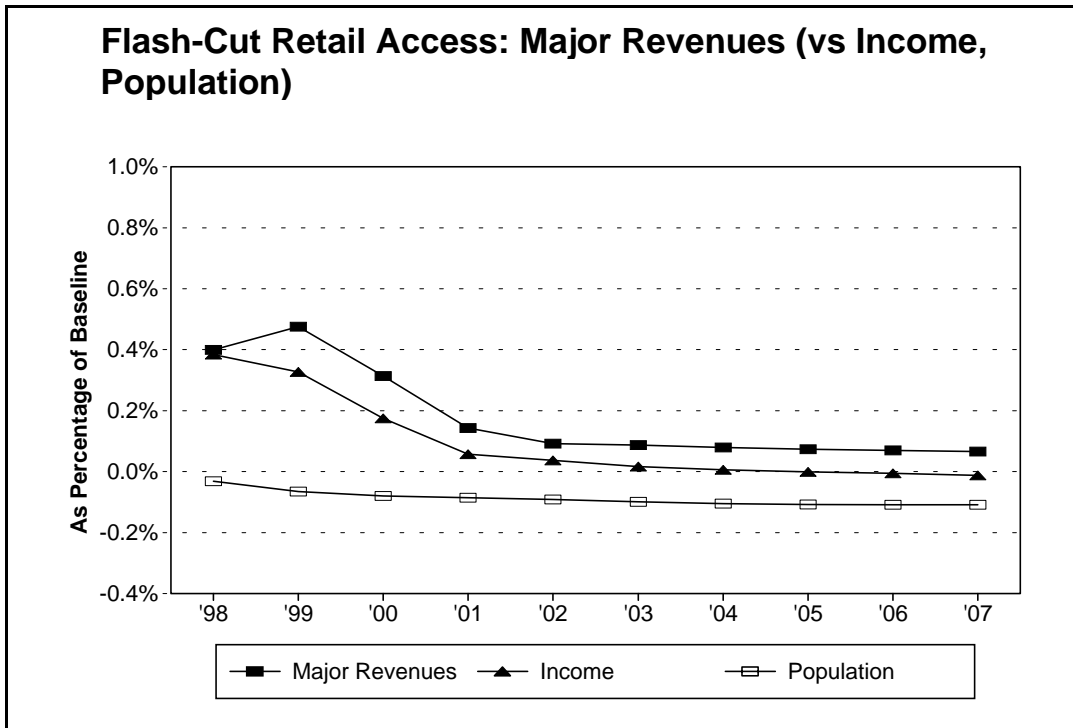


Table 6- 1  
Comparative Economic Impacts of Restructuring Scenarios

	Peak Year Impacts				Average Year Impacts (1998-07)			
	Scen1 (1998)	Scen 2 (2001)	Scen 3 (1998)	Scen 4 (1998)	Scen 1	Scen 2	Scen 3	Scen 4
EMPLOY (JOBS)	0.51%	0.25%	0.08%	0.46%	0.12%	0.06%	0.03%	0.06%
Mining	0.70%	0.32%	0.08%	0.70%	0.21%	0.09%	0.02%	0.20%
TCPU	1.07%	0.70%	0.09%	0.98%	0.57%	0.36%	0.03%	0.47%
Retail Trade	0.78%	0.43%	0.14%	0.70%	0.26%	0.14%	0.08%	0.19%
Service	0.49%	0.22%	0.08%	0.44%	0.09%	0.02%	0.03%	0.03%
St & Loc Gov	-0.03%	-0.03%	0.00%	-0.05%	-0.09%	-0.04%	0.01 %	-0.16%
Other	0.50%	0.22%	0.08%	0.45%	0.07%	0.03%	0.02%	0.02%
PERSONAL INCOME:								
Current \$	0.38%	0.22%	0.06%	0.35%	0.08%	0.04%	0.02%	0.04%
Constant \$	0.54%	0.39%	0.10%	0.40%	0.28%	0.18%	0.07%	0.12%
POPULATION	-0.03%	-0.03%	0.00%	-0.05%	-0.09%	-0.04%	0.01%	0.16%
	(FY'99)	(FY'00)	(FY'99)	(FY'99)				
MAJOR REVENUES:	0.48%	0.22%	0.06%	0.46%	0.12%	0.08%	0.02%	0.16%
Fed Min Roy	0.85%	0.37%	0.10%	0.84%	0.20%	0.15%	0.04%	0.30%
Severance Tax	0.80%	0.35%	0.10%	0.79%	0.20%	0.14%	0.03%	0.28%
Sales Tax	0.26%	0.09%	0.04%	0.23%	0.06%	0.03%	0.02%	0.04%
Use Tax	0.56%	0.18%	0.06%	0.56%	0.17%	0.10%	0.02%	0.26%
Ad Valorem Tax	0.32%	0.19%	0.04%	0.32%	0.08%	0.06%	0.01%	0.11%

The economic analysis indicates the Phased Retail Access scenario would have its peak impact in 2001, when Baseline jobs would be increased by 0.25 percent and Baseline personal income by 0.21 percent, but these effects would be rapidly dissipated by Federal Reserve policies to moderate inflation and unemployment, resulting in impacts well under 0.1 percent after 2001. As the positive impacts on jobs and income are smaller under the Phased Retail Access scenario than under the Flash-Cut scenario, so are the negative effects on resident population.

In 2001 and thereafter, the electricity price effects of the Phased Retail Access scenario equal those estimated for the Flash-Cut scenario. However, the year 2001 economic impacts

estimated for the Phased Retail Access scenario are *greater* than for the Flash-Cut scenario, in which the dissipation of earlier impacts is more complete.

Similarly, the electricity price effects estimated in the Phased Retail Access scenario are a bit greater first full year (2001) than in the Flash-Cut scenario (1998). Yet the economic impacts of the Phased Retail Access scenario in 2001 are *less* than those of the Flash-Cut scenario in 1998, due to the dissipation of impacts from earlier years under the Phased Retail Access scenario.

### **6.2.2 Impacts for Wyoming Economic Sectors**

The economic analysis indicates that the electricity price changes under the Phased Retail Access scenario would result in small positive impacts in most Wyoming economic sectors in 2001: about 0.7 percent in transportation, communications and public utilities (versus 1.1 percent in 1998 for the Flash-Cut scenario), about 0.4 percent in retail trade (versus 0.8 percent in 1998 in the Flash-Cut scenario), about 0.3 percent in the mining sector (versus 0.7 percent in 1998 for the Flash-Cut scenario), and about 0.2 percent for services (versus 0.5 percent in 1998 for the Flash-Cut scenario). With the exception of utilities (where impacts persist at over half of their peak), all sector impacts dissipate rapidly after 2001.

### **6.2.3 Impacts for Wyoming Revenues**

The fiscal analysis of the Phased Retail Access scenario indicates a very small but positive impact on major revenues. Impacts peak in 2000 at 0.2 percent (less than half the peak impact of the Flash-Cut scenario) but decrease to less than 0.1 percent by 2001. In the Phased Retail Access scenario, the peak effects on severance taxes and federal mineral royalties (responsive to mining activity) peak in 2000, whereas the peak effects on sales and use and ad valorem tax collections (responsive to activities in the commercial and residential customer classes) are delayed until 2001.

## **6.3 Large Industrial Retail Access (Scenario 3)**

The Industrial Retail Access scenario assumes that beginning in 1998 large industrial consumers in Wyoming and the rest of the country are eligible for retail access, but that commercial and residential customers (both in Wyoming and the rest of the country) continue to receive electricity from utilities operating as regulated monopolies.

### **6.3.1 Overall Economic Impacts**

The economic analysis of the Industrial Retail Access scenario indicates that the overall economic impact on the Wyoming economy would be almost negligible, but positive. Peak impacts on jobs and income (in 1998) would be less than 0.1 percent. Impacts on population are virtually zero. With no changes in electricity prices for the residential consumer class in Wyoming or elsewhere, the price advantage which Wyoming residents presently enjoy would remain unchanged.

### **6.3.2 Impacts for Wyoming Economic Sectors**

Though the Industrial Retail Access scenario affects electricity prices for industrial customers only, the economic impacts are similarly small (less than 0.2 percent) for the retail trade and service sectors as for the mining and TCPU sectors.

### **6.3.3 Impacts for Wyoming Revenues**

The fiscal analysis of the Industrial Retail Access scenario indicates positive but almost negligible (less than 0.1 percent) effects on Wyoming's four major revenue sources.

## **6.4 Non-Participation in Wyoming (Scenario 4)**

The Wyoming Non-Participation scenario assumes that electricity markets are fully competitive beginning in 1998 in the rest of the country, but that all Wyoming customers continue to be served by utilities operating as regulated monopolies. The electricity industry analysis indicates that such policies would reduce electricity prices in the rest of the country while Wyoming customers would continue to enjoy their current (relatively low) electricity prices, but receive no price reductions. In this scenario, Wyoming customers receive no electricity cost savings, and Wyoming's electricity price advantage over the rest of the country is reduced more substantially than under the Flash-Cut scenario.

### **6.4.1 Overall Economic Impacts**

The economic analysis of the Wyoming Non-Participation scenario indicates impacts at levels slightly below those estimated for the Flash-Cut scenario, both in the peak year (1998) and in the out years of the projection period. Resident population in 2007, which is reduced by 0.11 percent under the Flash-Cut scenario, is reduced by 0.21 percent under the Wyoming Non-Participation scenario.

The Flash-Cut scenario suggests that the Wyoming economy benefits in a small but positive manner through full participation in competitive electricity markets. The Wyoming Non-Participation scenario suggests that the Wyoming economy pays a small price by not participating in the nationwide move to competitive retail power markets. Compared to the Flash-Cut scenario, the small initial economic benefits (in jobs and income) of the Wyoming

Non-Participation scenario are a bit less positive, and the small out-year economic losses (in income, population and service, government and other jobs) are a bit more negative.

What is the explanation of these subtle differences? The national economic context (i.e., overall national electricity prices and their implications for Wyoming export industries) is the same under the two scenarios. The small stimulation to the Wyoming economy of small reductions in electricity prices for Wyoming customers (which is foregone in the Wyoming Non-Participation scenario) may explain part of the difference. The somewhat greater reduction in Wyoming's electricity price advantage over the rest of the country (and its marginal effects on the competitiveness of certain Wyoming manufacturing, service and other businesses) may explain another part.

#### ***6.4.2 Impacts for Wyoming Economic Sectors***

The economic analysis indicates sector impacts of the Wyoming Non-Participation scenario similar to the economic analysis overall. Sector impacts are slightly below (slightly less positive or more negative) than those estimated for the Flash-Cut scenario.

Neither the Wyoming economy overall nor particular sectors pay a heavy price by not participating in the move to competitive retail power markets.

#### ***6.4.3 Impacts for Wyoming Revenues***

The conclusions of the fiscal analysis of the Wyoming Non-Participation scenario are consistent with those of the economic analysis: revenue impacts are very slightly below (less positive or more negative) those estimated for the Flash-Cut scenario.

## 7.0 Sensitivity Scenarios of Flash-Cut Electric Restructuring

As discussed earlier, the price impacts to be experienced in a competitive power generation market are of significant speculation and uncertainty. For this reason, several sensitivity scenarios were developed addressing the impact of differing overall price levels, inter-class price levels, and nation-wide price levels for the Flash-Cut Restructuring Scenario (Scenario 1). This Section of the report addresses the competitive power generation market price impact scenarios conducted and the resultant economic and fiscal impacts estimated using the REMI model.

### 7.1 Electric Generation Market Price Variation

Market price sensitivity scenarios were constructed to provide insight as to the potential impact of higher or lower power generation market prices on overall electricity prices, stranded costs and Wyoming's state economy. These Market Price scenarios applied a relatively broad range of generation market prices over which to assess the associated impacts. These scenarios were designed to be class-neutral, in that the same percentage generation market price variations were assumed for all consumer classes.

#### 7.1.1 Electric Price and Stranded Cost Impacts

The Market Price scenarios assumed competitive generation market prices to be 10 percent higher or 10 percent lower than those resulting from the Flash-Cut scenario simulation discussed in Section 4.0. The resultant annual consumer class electricity price impacts prior to recovery of stranded utility costs are illustrated on Figure 7-1A and summarized in Table 7-1.

The High Market Price restructuring scenario resulted in first year electricity prices 11 percent below the Traditional Scenario when averaged across all classes, in comparison to 16 percent for the Flash-Cut restructuring scenario. The long-run (post 2002) electricity prices of this scenario *increased* an average one percent over the Traditional scenario, versus a five percent *decrease* for the Flash-Cut restructuring scenario.

The Low Market Price scenario resulted in first year electricity prices 20 percent below the Traditional scenario, when averaged across all classes. The long-run prices were nine percent below the Traditional Scenario, when averaged across all class. Long-run price impacts of this scenario are similar to the nation-wide price impacts estimated for the Flash-Cut scenario as discussed in Section 4.4.

**Figure 7-1A and 7-1B**

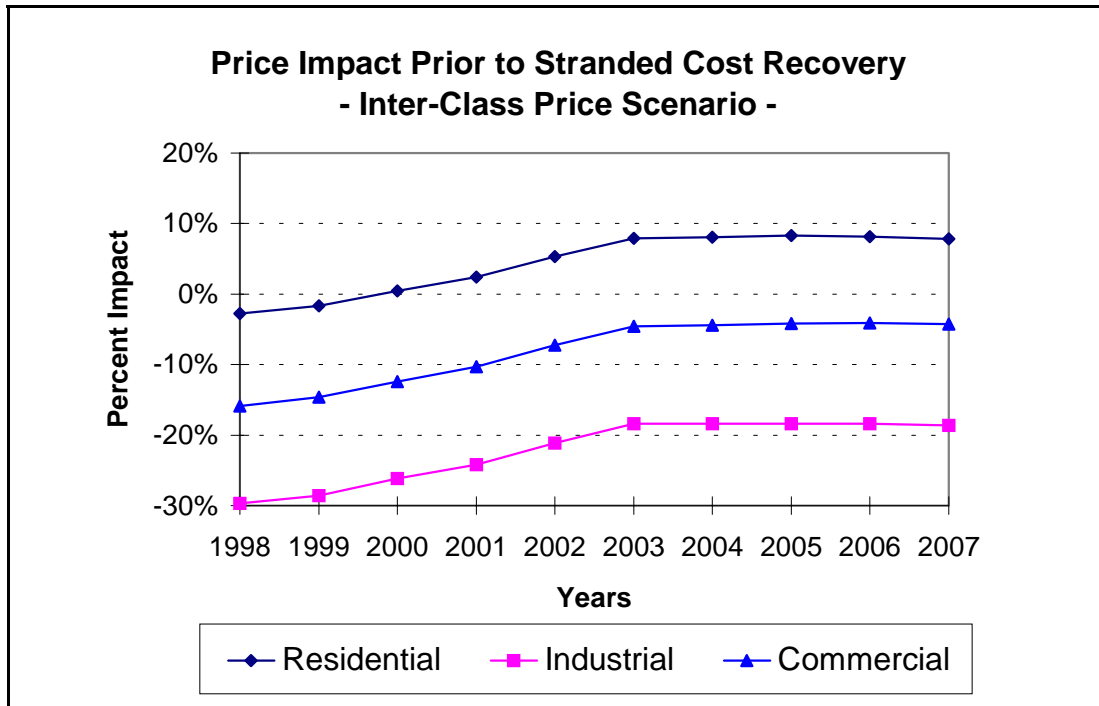
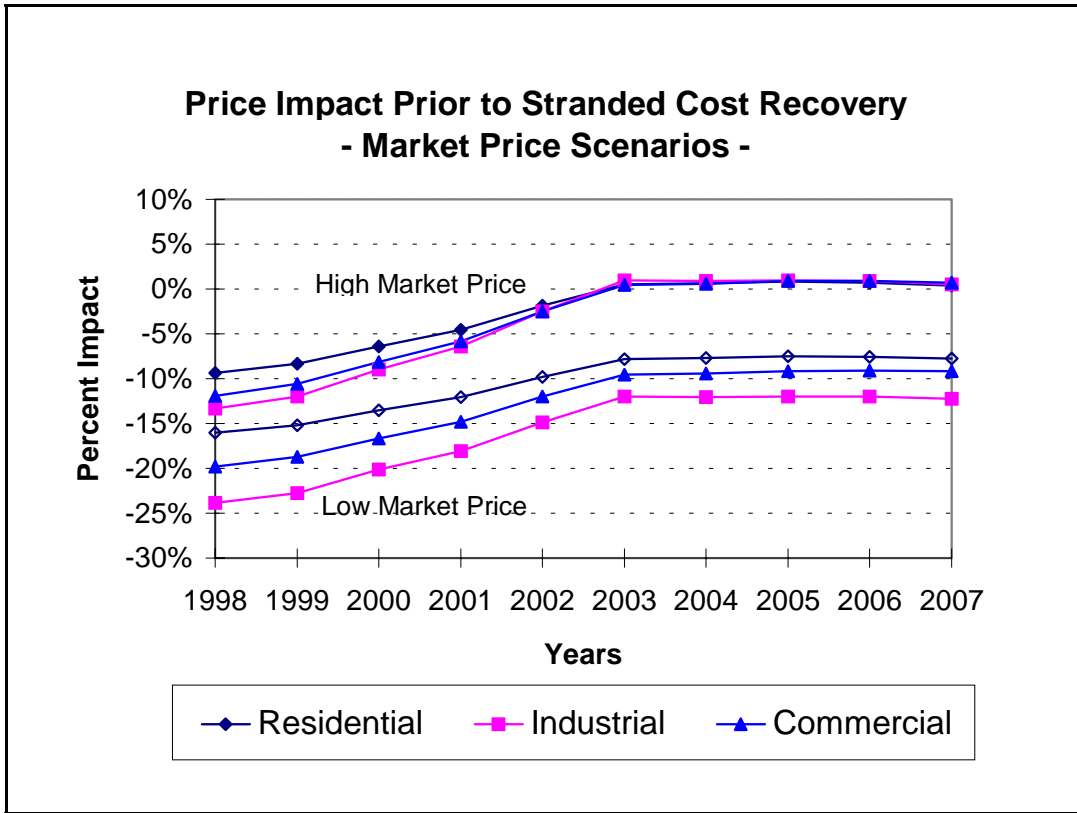




Table 7-1  
 State-Wide Average Electricity Price Impacts for Sensitivity Scenarios <sup>[1]</sup>  
 (Average Annual Percentage Impact)

	Residential	Commercial	Industrial	All Class
<u>Scenario 1 Impact</u> <sup>[2]</sup>				
Short-Run Market Prices				
- 1998-2002	-9.7	-12.1	-14.3	-12.3
Long-Run Market Prices				
- 1998-2002	-4.7	-5.5	-6.3	-5.5
- 2003-2007 <sup>[3]</sup>	-3.5	-4.3	-5.6	-4.8
<u>HIGH Market Prices</u>				
Short-Run Market Prices				
- 1998-2002	-6.1	-7.5	-8.6	-7.4
Long-Run Market Prices				
- 1998-2002	-0.6	-0.5	+0.2	-0.4
- 2003-2007 <sup>[3]</sup>	+0.6	+0.7	+0.9	+0.7
<u>LOW Market Prices</u>				
Short-Run Market Prices				
- 1998-2002	-13.3	-16.0	-19.9	-16.4
Long-Run Market Prices				
- 1998-2002	-8.8	-10.1	-12.7	-10.7
- 2003-2007 <sup>[3]</sup>	-7.7	-9.3	-12.1	-9.6
<u>INTER-CLASS Prices</u>				
Short-Run Market Prices				
- 1998-2002	+0.8	-12.1	-25.9	-11.9
Long-Run Market Prices				
- 1998-2002	+6.7	-5.5	-19.0	-5.5
- 2003-2007 <sup>[3]</sup>	+8.0	-4.3	-18.4	-4.5
<u>NATION-Wide Prices</u>	No Impact on Wyoming Prices			

<sup>[1]</sup> Prior to recovery of utility stranded costs.

<sup>[2]</sup> As reported in Section 4.0.

<sup>[3]</sup> The long-run market price impacts are calculated in 1998-2002 only for the purpose of later economic and fiscal analysis.

The Market Price scenarios had a somewhat greater percentage impact on the industrial consumer class in comparison to the other classes, as the generation component of overall electricity price (including transmission and distribution) is highest for this class.

The resultant range of impact on utility stranded costs is illustrated on Figures 7-2A and 7-2B, along with the earlier Flash-Cut scenario results. Based on the range of short-run market prices applied in 1998, stranded costs in that year would range between \$63 million and \$109 million. The 10 year average stranded costs would range between \$16 million and \$80 million. The long-run (post 2002) stranded costs would be slightly negative under the high market price scenario.

### 7.1.2 Economic and Fiscal Impacts

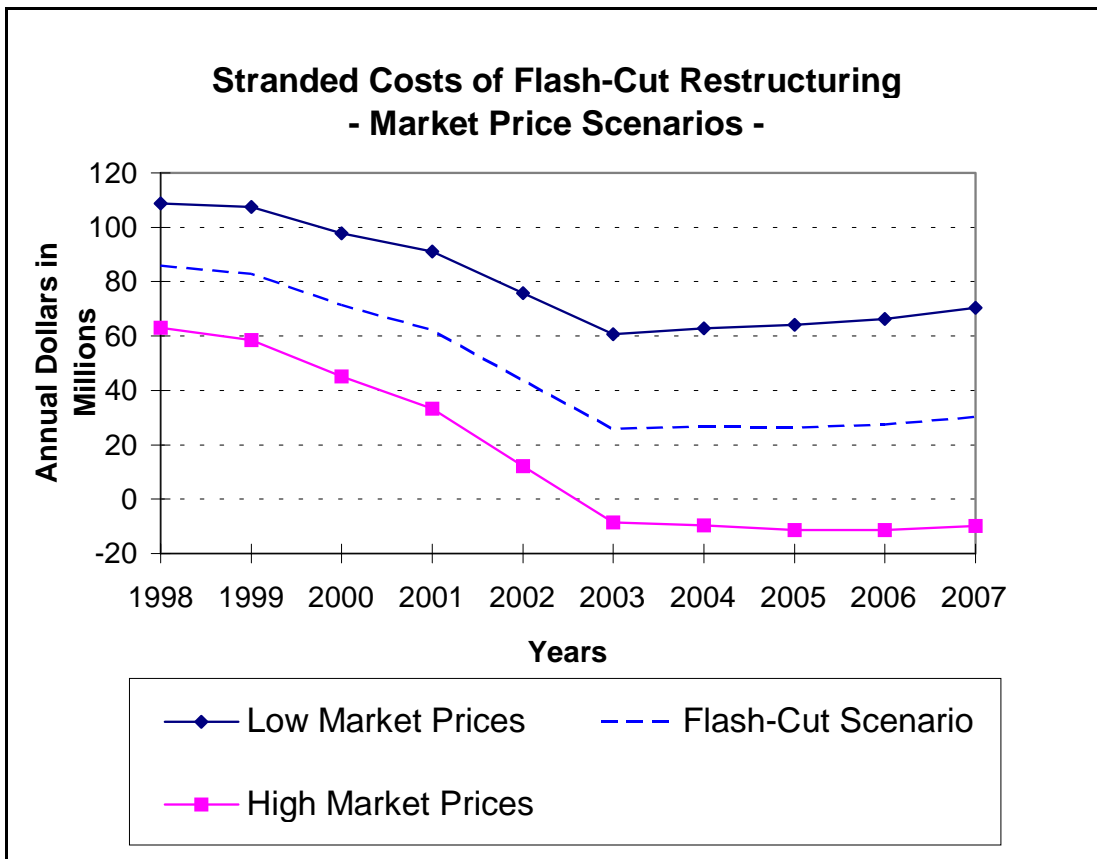
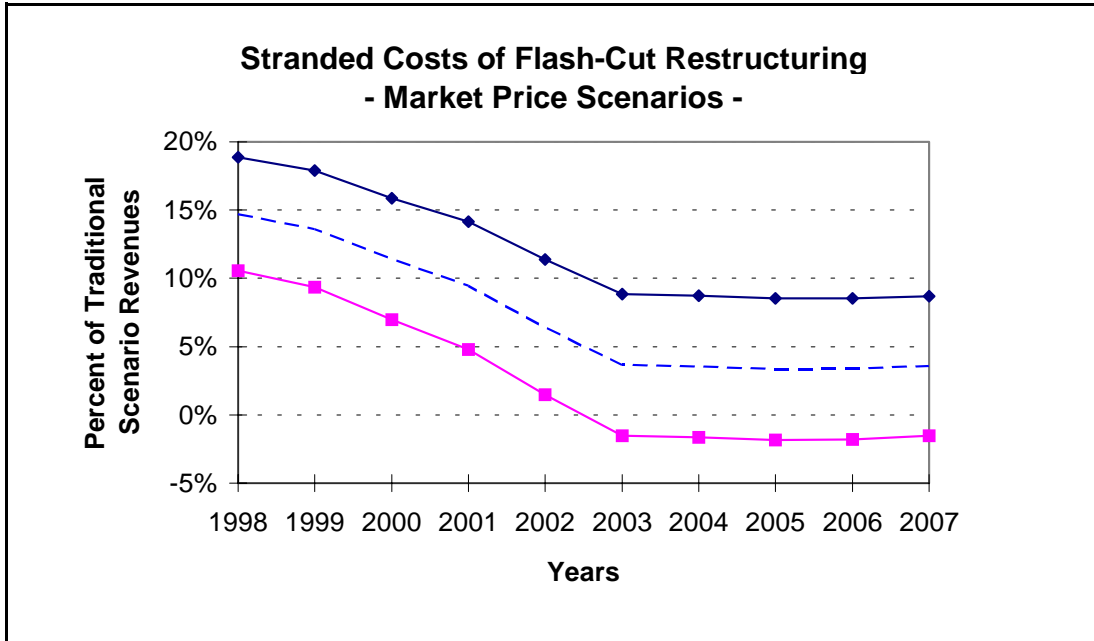
The comparative overall economic effects of the Market Price scenarios and other scenarios of this Section are summarized within Table 7-2 and Figure 7-3.

Table 7-2 Wyoming Economic Impacts of the Sensitivity Scenario										
	Peak Year Impacts					Average Year Impacts (1998-07)				
	Scen1 (1998)	S1a HI (1998)	S1b LO (1998)	S2 CL (1998)	S3 NW (1998)	Scen 1 (1998)	S1a HI (1998)	S1b LO (1998)	S2 CL (1998)	S3 NW (1998)
EMPLOY (JOBS)	0.51%	0.46%	0.57%	0.49%	0.21%	0.12%	0.06%	0.19%	0.10%	0.08%
Mining	0.70%	0.70%	0.70%	0.64%	0.25%	0.21%	0.20%	0.22%	0.14%	0.09%
TCPU	1.07%	0.97%	1.18%	0.62%	0.45%	0.57%	0.48%	0.68%	0.16%	0.29%
Retail Trade	0.78%	0.71%	0.88%	0.87%	0.31%	0.26%	0.19%	0.34%	0.34%	0.14%
Service	0.49%	0.44%	0.56%	0.50%	0.20%	0.09%	0.03%	0.16%	0.10%	0.07%
St & Loc Gov	-0.03%	-0.05%	-0.01%	-0.04%	-0.00%	-0.09%	-0.16%	-0.01%	-0.12%	0.01%
Other	0.50%	0.45%	0.57%	0.48%	0.21%	0.07%	0.03%	0.13%	0.04%	0.06%
PERSONAL INCOME:										
Current \$	0.38%	0.35%	0.43%	0.35%	0.16%	0.08%	0.04%	0.13%	0.04%	0.06%
Constant \$	0.54%	0.41%	0.70%	0.47%	0.26%	0.28%	0.12%	0.45%	0.21%	0.20%
POPULATION	-0.03%	-0.05%	-0.01%	-0.04%	-0.00%	-0.09%	-0.16%	-0.01%	-0.12%	-0.01%

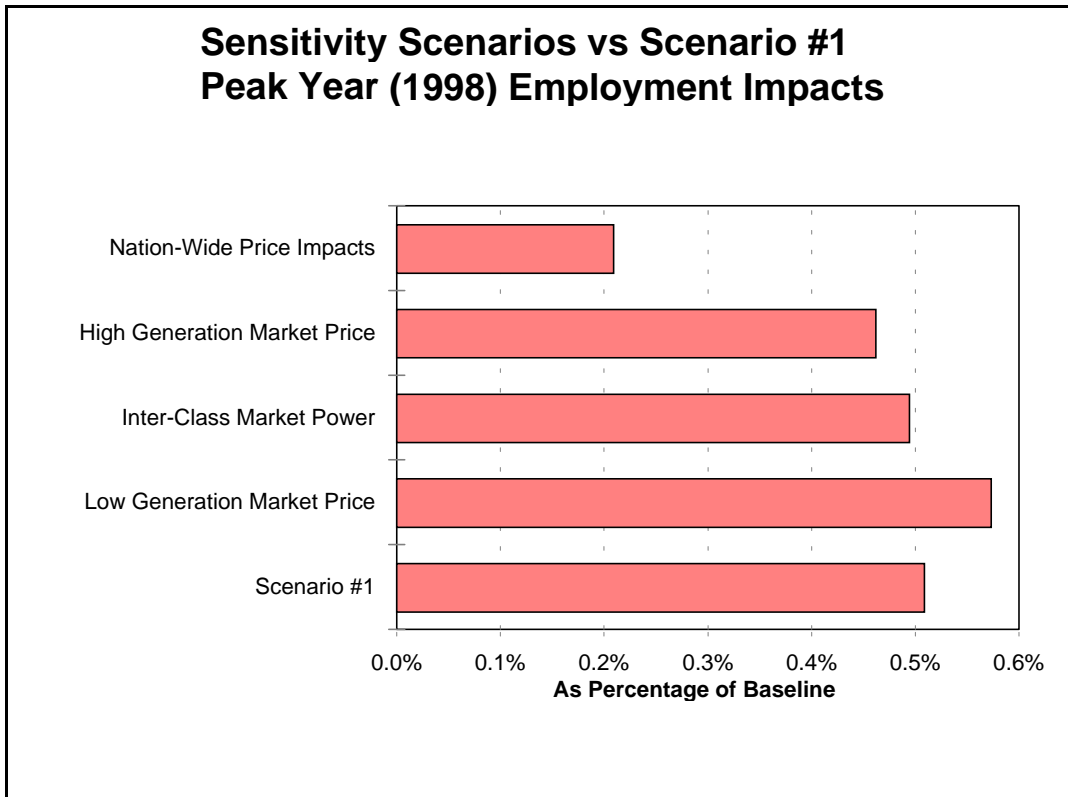
The Generation Market Price Variation scenarios suggest that Wyoming as a whole could gain or lose, though not by much, from price impacts falling on either end of a reasonable range of uncertainty for the electric energy market.

The economic analysis indicates that the Low Generation Market Price scenario somewhat increases the positive effect to the overall economy as compared to the

**Figures 7-2A and 7-2B**



**Figures 7-3**



Flash-Cut scenario as evaluated in Section 4.0. Peak year total employment (1998) is predicted to be 0.57 percent greater than Baseline, or slightly greater than the Flash-Cut scenario impact in 1998 (0.51 percent). In reverse fashion, the High Market Price Sensitivity scenario decreases the positive effect to the overall economy as compared to the Flash-Cut scenario as illustrated on Figures 7-4A and 7-4B. Peak total employment in 1998 is 0.46 percent greater than Baseline, slightly less than the Flash-Cut scenario impact.

Effects to key sectors of the economy follow the same pattern, raising or lowering impacts without shifting one sector versus another. An exception is mining, which remains relatively unaffected by the range of price changes applied here. Overall, the effects of the two Generation Market Price Scenarios seem to follow directly from customers of all classes in Wyoming experiencing additional savings on electricity under the Low Market Price scenario and additional costs under the High Market Price scenario as compared to the original Flash-Cut scenario simulation.

## 7.2 Inter-Class Electricity Price Variation

The Flash-Cut scenario generation market price analysis described in Section 4.0 assumed that each consumer class in effect pays the market price of energy and capacity each hour of the year. The average annual price paid by each class was essentially a summation of the prices across the associated load profiles. The analysis implicitly assumed that no consumer class could employ market power over other consumers in the competitive marketplace.

At present, competitive power markets are still in the development and interpretation stage throughout the U.S. Within this context, consumer (and supplier) market power is a major area of uncertainty. For this reason, a sensitivity scenario was developed varying the class prices from those observed in the original simulation for the Flash-Cut restructuring scenario.

### **7.2.1 Electric Price Impacts**

For this scenario, it was assumed that relative market advantage or other market factors were to further reduce industrial consumer electric generation market prices by 20 percent. It was concurrently assumed that residential consumer market prices would be comparably higher than the Flash-Cut restructuring scenario, such that total generation market revenue is the same as in that scenario. Commercial consumers were not incrementally impacted within this scenario.

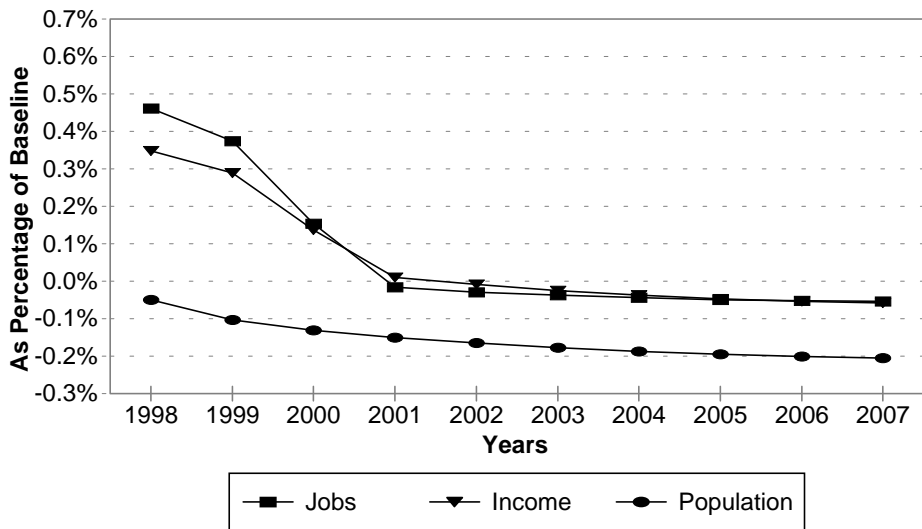
The resultant electricity price impacts of this scenario prior to recovery of stranded costs are illustrated on Figure 7-1B and summarized within Table 7-1. For the industrial class, first year state-wide electricity prices 30 percent below the Traditional scenario were observed, versus 19 percent for the Flash-Cut restructuring scenario. The long-run (post-2002) price reductions averaged 19 percent.

For the residential class, first year average prices were three percent below the Traditional scenario, versus 13 percent for the Flash-Cut scenario. The residential class experienced long-run price *increases* averaging about eight percent, versus price reductions of four percent for the Flash-Cut scenario.

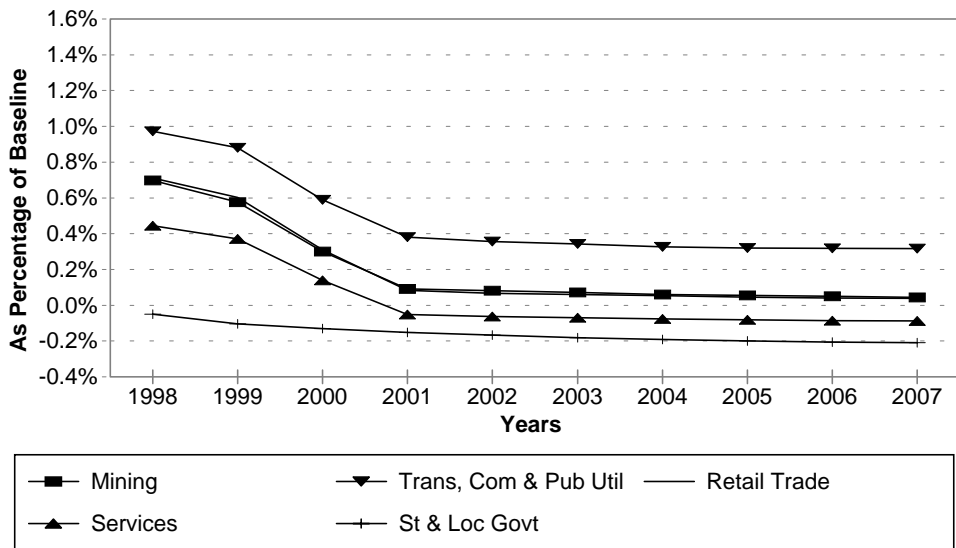
This scenario has no incremental impact on utility stranded costs, as the overall market revenue is assumed to be the same as for the original Flash-Cut scenario simulation.

## **Figures 7-4A and 7-4B**

### High Market Scenario: Overall Economic Effects



### High Market Price Scenario: Sector Employment Effects



## **7.2.2 Economic and Fiscal Impacts**

The Consumer Class Market Power scenario analysis suggests that a distribution of price reductions that favors industrial over residential consumers exacts a very slight employment cost on the economy as a whole.

The Inter-Class Market Power scenario reflects a redistribution of savings among customer classes away from the class-neutral distribution assumed earlier. The effect is to slightly decrease the benefit to the Wyoming economy overall. Peak year total employment (1998) is predicted to be 0.49 percent greater than Baseline compared to 0.51 percent greater than Baseline for the original Flash-Cut scenario. Though very small, the difference seems to reflect the relative importance of personal consumption to the Wyoming economy as portrayed by the REMI model. The effects of the Inter-Class Market Price scenario fall somewhat differently on key sectors, increasing the peak year (1998) employment impact to retail trade to 0.87 percent over Baseline from 0.78 percent over Baseline for the Flash-Cut scenario (11.5 percent) and decreasing the impact to transportation and public utilities to 0.62 percent over Baseline from 1.07 percent over Baseline for the Flash-Cut scenario.

## **7.3 Nation-Wide Electricity Price Variations**

The Nation-Wide Price Impacts scenario evaluates the influence of price impacts in the rest of the U.S. on the Wyoming economy by setting percentage price reductions for the rest of the U.S. equal to the reductions predicted for Wyoming under the original Flash-Cut scenario.

The effect of the Nation-Wide Price Impacts scenario is to noticeably decrease the benefit to the Wyoming economy overall, compared to Scenario 1. In absolute terms, this reduction in benefit is greater than any change either positive or negative exhibited by the other sensitivity scenarios. These results reflect the relative importance of economic activity in the rest of the nation for Wyoming's economy as portrayed by the REMI model.

Peak year (1998) total employment under the Nation-Wide Price Impacts scenario is predicted to be 0.21 percent greater than the Baseline, compared to 0.51 percent for the Flash-Cut scenario. Despite somewhat fewer jobs state-wide, population growth in Wyoming would be slightly stronger under the Nation-Wide Price Impacts scenario, than under the Flash-Cut scenario, reflecting how the rest of the nation forgoes some of its "pull" on economic migrants if it is afforded less relief on electric prices.

Impacts to key sectors of the economy also are lowered across the board by the Nation-Wide Price Impacts sensitivity scenario, without greatly affecting the composition of the economy. An exception is state and local government employment, which reflects the predicted population trend by growing slightly and gaining slightly in share.

## 7.4 Impact of Additional Electricity Export From Wyoming

As discussed in Section 4.0, the market prices applied in the restructuring scenario power competitive generation market representation are driven by the marginal price of electricity production. Production of additional electricity for use within a given market or exported to another market will likely increase the marginal price of energy, in turn increasing the market clearing price paid by all consumers in the exporting region.

This is not considered an important issue for the Wyoming region at present, since the existing transmission system is essentially fully utilized for export. However, to aid the interpretation of this issue, a scenario was constructed assuming additional transmission capability were available linking the Wyoming area with the higher marginal price California-Nevada market. This scenario broadly addresses the issue of additional power export in an open market 'bidding-up' the local market price.

It was assumed for analysis purposes that 1,000 MW of additional transmission capability existed, without addition of new generating capacity.<sup>1</sup> This market simulation indicated that additional electricity would produced and exported from the Wyoming region, although the average increase was 100 to 200 MW. The simulation also indicated that the additional production of electricity in the Wyoming region might increase the average annual market clearing prices on the order of 0.15 Cent per kWh, translating to roughly a five percent increase in the overall power generation market price. It should be noted that the likelihood of additional transmission capability of this magnitude being added without the installation of additional generating capacity would be relatively unlikely, due to the large investment involved. This would be especially true considering the relatively low utilization of the new transmission investment for export.

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<sup>1</sup>Section 8.0 includes a scenario whereby new generating capacity is added in Wyoming in conjunction with additional transmission capability.



## **8.0 Feasibility and Impact of New Wyoming Generating Capacity**

This Section summarizes a brief analysis conducted regarding the market and financial feasibility of installing additional coal-fueled or natural gas-fueled electric generating capacity in Wyoming to serve in-state or out-state electric loads in a restructured power generation environment.

### **8.1 Background Considerations to the Feasibility Analysis**

The following background factors were addressed and are summarized here related to the additional generating capacity feasibility analysis.

#### ***8.1.1 Wyoming Generation Supply and Load Balance***

The state of Wyoming is a major net exporter of electricity. At present, 6,000 MW of electric generating capacity is installed within Wyoming, in comparison to a peak in-state consumer demand of approximately 2,500 MW. During many hours of the year, and especially times of high regional demand for electricity, most of these generating facilities are operating at or near full capability, resulting in a large power export from the State. This situation precludes the need for new generating capacity in Wyoming for the purpose of reliably supporting in-state electric loads.

#### ***8.1.2 Regional Transmission System Capability***

A further review was conducted of inter-regional transmission system loadings, to address the likelihood of the existing transmission system supporting higher levels of power transfer from the State. The regional power production simulations conducted for the Traditional Industry Scenario and the Flash-Cut restructuring scenario, as well as other recent studies reviewed, verify that the existing regional transmission system is nearly or fully utilized for power exports a majority of hours per year. Based on this review, new transmission capacity would be needed for the export of significant additional electricity from the State.

## **8.2 Evaluation of New Gas-Fueled Generation**

The feasibility of additional gas-fueled generating capacity installed in Wyoming was briefly evaluated from the standpoint of serving in-state and out-state loads in the restructured electric industry market. Additional generating capacity installed in Wyoming fueled with natural gas would be priced and dispatched into the regional power market after all hydraulic and coal-fueled resources, due to the relatively high cost of natural gas fuel for

power generation. The constrained transmission system would result in electricity from the new generation being constrained as to delivery, unless new transmission capability was developed.

Due to the multiplicity of sources and relatively low transportation costs for natural gas, the delivered price of this fuel does not vary greatly from one region of the western U.S. to another. Intuitively, the economic feasibility of constructing new electric transmission capacity for export of gas-fueled electricity from Wyoming to other locations would seem unlikely. A brief comparative analysis was conducted to verify this intuitive conclusion. Energy losses are excluded from this comparison, as such losses would be similar for natural gas and electric power transmission.

A generalized average price to transport natural gas in the Western U.S. is about five Cents per MBtu per 100 miles. Although specific point-to-point prices vary dramatically, this value is reasonable to apply within general feasibility comparisons. Assuming natural gas transported for consumption at an electric generator exhibiting an efficiency of 38 percent (9,000 Btu/kWh), the average price of transportation per unit of ultimate electricity would be about 0.045 Cent per kWh per 100 miles.

A brief review of open access electric transmission tariffs recently filed by electric utilities in response to FERC Rule 888 indicated a typical point-to-point price of \$10 to \$25 per kW annually. Assuming a relatively high capacity factor of 40 percent for electricity across the transmission line and a 400 mile point-to-point transport distance, a transportation price of 0.075 to 0.20 Cent per kWh per 100 miles is estimated. The mid-point of this value is three times higher the typical price of transporting natural gas. From the above analysis, it appears unlikely that natural gas-fueled power plant capacity would be installed within Wyoming for export to other areas of the Western U.S. Based on this analysis, the installation of additional natural gas-fueled electric capacity was not further evaluated within the Study.

### **8.3 Methodology of the Coal-Fueled Generating Capacity Analysis**

The feasibility analysis of new generating capacity installed in the State of Wyoming to serve in-state or out-state electric loads applied the same inter-regional electric supply simulation applied to previous industry analysis of this Study. The new generating capacity was modeled as participating within the competitive generation market simulated for the Flash-Cut restructuring scenario. The revenue garnered by the new generating capacity within the competitive generation market was estimated and compared against the revenue estimated to achieve a target rate of return on investment. This analysis assumed the new generating capacity could begin operation as early as January 1, 2002.

### 8.3.1 Inter-Regional Market Considerations

The feasibility of new coal-fueled generating capacity in Wyoming was evaluated from both the standpoint of serving electric consumer loads in the Wyoming area, and serving loads in other regions of the Western U.S. It was assumed that serving loads in the Wyoming area would not require installation of new transmission facilities, other than possible outlet facilities connecting the generating capacity to existing transmission facilities within the State. It was assumed that serving significant load outside of the Wyoming area would require the installation of new inter-regional transmission capacity.

Table 8-1 summarizes the comparative inter-regional market energy prices applied in the Study, as discussed within Section 3.0. The market energy prices in the California-Southern Nevada area are significantly higher than the other western U.S. regions. Based on the relatively high energy price differentials between the Wyoming market and the California-Nevada market, the evaluation assumed expansion of the electric transmission system linking these markets, to support export of electricity from the additional generating capacity in Wyoming.

Table 8-1 Regional Annual On-Peak Market Clearing Energy Prices <sup>[1]</sup> (Cent per kWh)			
Region	1997	2002	2007
Wyoming Area <sup>[2]</sup>	1.63	1.71	1.88
Northwest Power Pool	1.59	1.66	1.82
Arizona-New Mexico	1.65	1.73	1.96
California - So. Nevada	1.83	1.95	2.15
MAPP Pool <sup>[3]</sup>	1.60	1.70	1.87

<sup>[1]</sup> Excludes value of capacity  
<sup>[2]</sup> Includes areas of Utah, Idaho, Colorado and South Dakota served by utilities which also serve consumers in Wyoming.  
<sup>[3]</sup> This region is actually part of the Eastern U.S. transmission grid.

### **8.3.2 New Transmission Line Price and Operating Characteristics**

For delivery of additional electricity from the Wyoming area to the California- Nevada market, a new 500 kilovolt alternating current (A.C.) transmission line was assumed from central Wyoming to the Southern Nevada area, a distance of approximately 650 miles. The path for such a transmission line would include roughly 300 miles of mountainous terrain. Overall cost to construct the line was estimated to be \$750,000 per mile in 1997 dollars, plus \$60 million for substation (interconnection) facilities, resulting in a total cost of \$547 million (1997\$). It was estimated the transmission line could transport 1,100 MW of bulk electricity, and that capacity and energy losses would be approximately one percent per 100 miles. For the distance considered here, the A.C. transmission line would be less costly than a direct current (D.C.) transmission line.

The Baseline evaluation assumed the transmission line to be owned and financed by a taxable entity. It was assumed the transmission line investment would be amortized over a 30 year period and would achieve an average return on investment of 10 percent. From these assumptions, a first-year (year 2002) tariff of \$48 per kW was estimated for the new transmission capacity, increasing annually at the rate of inflation.

### **8.3.3 Cost and Price Assumptions for New Generating Capacity**

The new coal-fueled generating capacity was assumed to be a single unit, 700 (net) MW facility constructed at a new site, fueled by sub-bituminous coal from the Southern Powder River Basin. Several potential sites were briefly evaluated, including sites adjacent to rivers in the vicinity of the Basin. Water availability would be an important siting (and cost) factor, as would rail and electric transmission access. Overall capital cost of the generating capacity was estimated to be \$875 per kW in 1997 dollars, including construction financing and other development costs, resulting in an estimated investment of \$612 million (1997\$).

The evaluation assumed the generating capacity to be owned and financed by a taxable entity. A revenue target was estimated for each year, based on recovery of all fixed costs and earning a rate of return on investment. It was assumed that investors would expect to recover the plant investment and earn a return on investment of 10 percent over a 20 year operating period. The resultant revenue target was estimated to be \$116 per kW in year 2002, escalating annually at the general inflation rate. A lower level of revenue would reduce the achieved rate of return over a given time period, and a higher level of revenue would increase the achieved rate of return.

The delivered coal fuel price for the generating capacity was assumed to be \$0.53 per MBtu in 1997 dollars. For consistency with fuel assumptions applied to other regional generating facilities, the regional coal fuel price forecast discussed in Section 3.4 was applied to the new generating capacity. This forecast assumes coal prices are essentially flat through

year 2000, gradually increasing thereafter to a level consistent with general inflation. The resultant delivered price of fuel for the new plant in year 2002 was \$0.56 per MBtu.

## **8.4 Results of the Coal-Fueled Generating Capacity Evaluation**

The new coal-fueled generating capacity was evaluated both without and with the concurrent expansion of inter-regional transmission capability. The inter-regional electric supply representation discussed in Section 3.0 was applied to both scenarios, to estimate the electricity produced and revenue garnered by the new generating capacity.

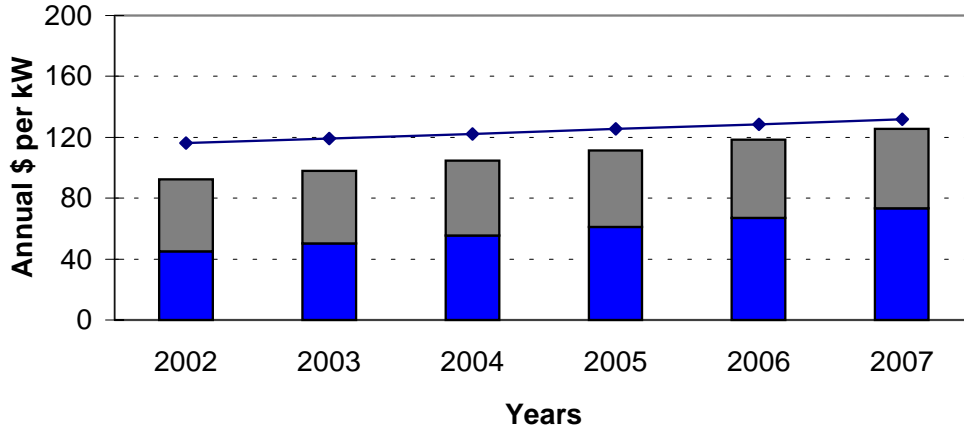
Under both scenarios, the competitive market simulations indicated the new generating capacity would operate in base-load mode, since the facility has very low operating cost characteristics. In the scenario excluding transmission expansion, the new generating capacity primarily displaces electricity production from existing generators within the Wyoming area. In the scenario with expanded transmission capacity, electricity from the new generating capacity was shown to be exported to the California-Nevada region, as was additional electricity from other Wyoming area power generators.

Results of a financial analysis for the scenario without transmission expansion are illustrated on Figure 8-1A. Energy revenues were based on estimated market clearing prices in the Wyoming area, net of fuel and other variable operating expenses, resulting in \$46 per kW in the first year. Regarding capacity price contribution, it was assumed that adding generating capacity to the Wyoming market without new transmission would effectively result in a surplus of supply, constraining the value of capacity. For this purpose, it was assumed that the value of capacity in year 2002 would be 30 percent below the long-run value, gradually increasing to 100 percent in year 2007. The combined revenue components resulted in a revenue shortfall of about 20 percent in the first year, rebounding to about five percent the final year. Based on this result, this scenario was not further evaluated.

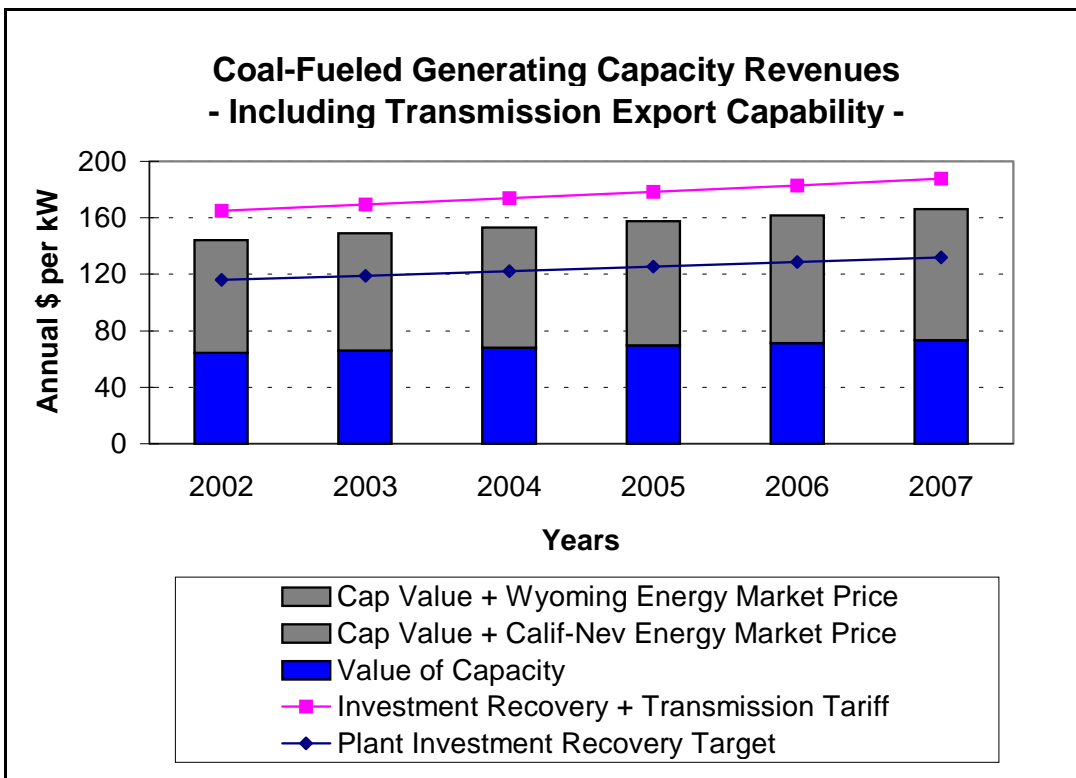
Results of the financial analysis for the scenario with new transmission capacity to the California-So. Nevada market area are illustrated on Figure 8-1B. The transmission tariff discussed above was combined with the plant investment recovery target to estimate an overall revenue target for each year. The California-Nevada

## Figures 8-1A and 8-1B

### Coal-Fueled Generating Capacity Revenues - Excluding New Transmission Capability -



### Coal-Fueled Generating Capacity Revenues - Including Transmission Export Capability -



energy market price forecast discussed in Section 3.4 was applied to estimate energy revenues for this scenario, producing significantly higher values than the Wyoming market. Because there is sufficient transmission capacity to export the additional power, the full value of capacity as estimated in Section 3.0 was applied to this scenario. The combined market capacity and energy revenues of this scenario were estimated to produce about 88 percent of the target revenue.

#### **8.4.1 Impact of Project Scale and Ownership Assumptions**

There are of course many uncertain factors regarding a feasibility evaluation such as discussed here. Uncertainty of the competitive market prices has been previously discussed. Two sensitivity studies were briefly performed to gauge the impact of additional assumptions.

A larger generating capacity development, perhaps including two generating units as large or larger than considered above, might reduce the per kW construction and development costs by as much as ten percent. Such a development would involve more risk from the standpoint of committing additional capital and being dependent on a larger market for sale of electricity. This opportunity was addressed only for the scenario including new inter-regional transmission capacity. The analysis indicated a generating capacity project of this scale might reduce the above revenue shortfall by two-thirds.

A brief sensitivity analysis was also conducted regarding of the possible impact of public ownership or backing of the transmission capacity. The analysis assumed 100 percent debt financing at a 6.5 percent effective interest rate. The analysis indicated these assumptions would potentially reduce the annual transmission tariff roughly 20 percent, offsetting almost one-half the earlier revenue shortfall for this scenario.

#### **8.4.2 Trade-Off Between Coal Transportation and Electricity Transmission**

A brief comparison was made of coal transportation and electricity transmission, to address the relative feasibility of the new coal-fueled generating capacity in Wyoming versus a location closer to inter-regional markets.

Western coal rail shipment prices are estimated to typically range from \$0.70 to \$1.40 per ton per 100 miles, dependent in part on the transportation options available. Assuming a fuel heat content of 8,600 Btu per pound and electric generation efficiency of 34 percent (10,000 Btu per kWh), this translates to a typical price range of 0.04 to 0.08 Cents per kWh per 100 miles.

Applying the transmission system price information of Section 8.2 and substituting an 85 percent coal-fueled generation capacity factor for the 40 percent value assumed earlier results in a price range of 0.035 to 0.07 Cent per kWh per 100 miles. This range is very

comparable to the coal transportation range listed above. This comparison indicates that the trade-off between new generating capacity near the fuel source and generating capacity near the load center would likely be driven by project-specific competitive and regulatory factors.

#### **8.4.3 Considerations Regarding Restructuring Scenarios 2 Through 4**

Retail access would be fully implemented under the Phased Access scenario when the generating capacity begins operation, and as such is not unique from the Flash-Cut scenario in this evaluation. Based on open access to the inter-regional transmission system independent of retail access development, and assuming the inter-regional power generation market remains highly competitive under the Industrial Access scenario and Wyoming Non-Participation scenarios, there would be no identified unique impacts of these implementation scenarios on the financial feasibility of the coal-fueled generating capacity.

### **8.5 Economic and Fiscal Impacts of Coal Generating Capacity**

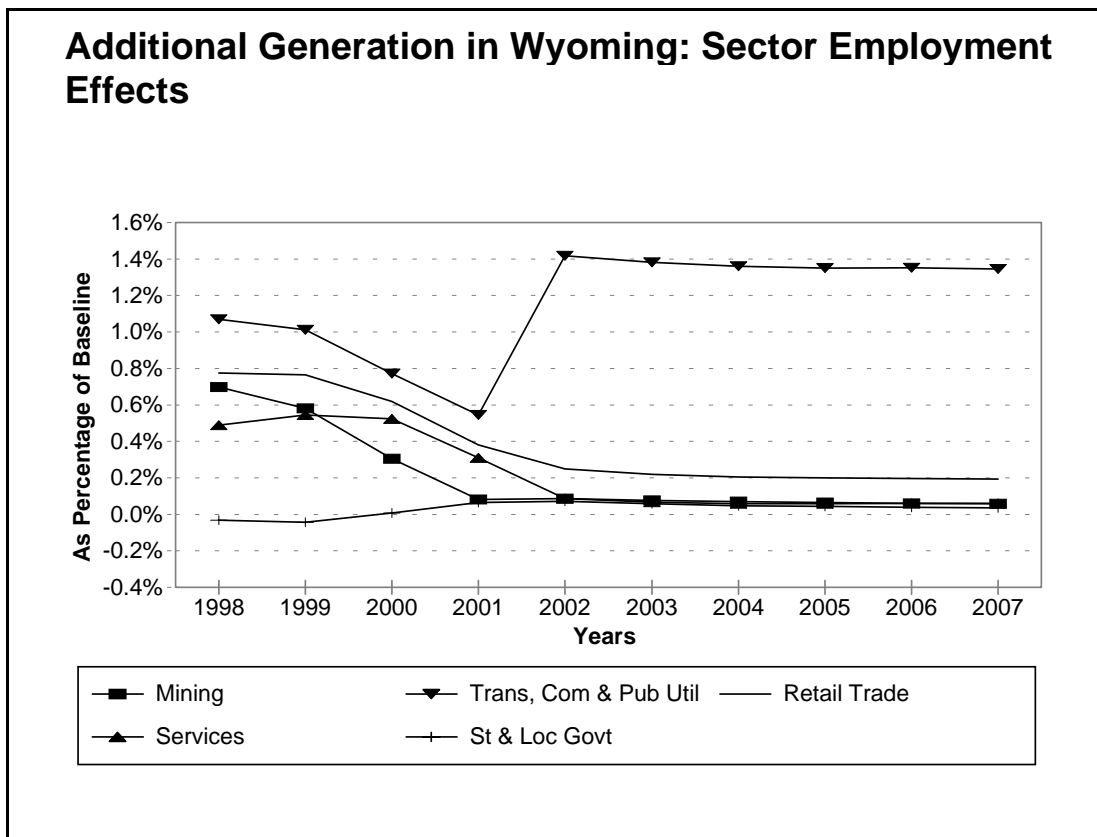
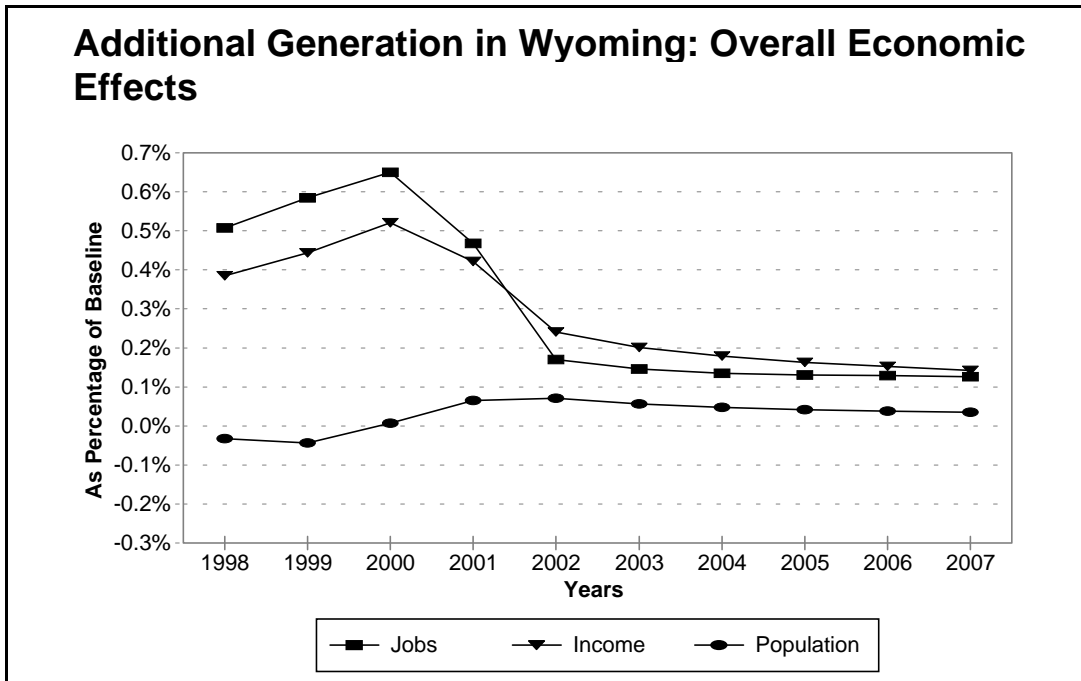
The economic evaluation of additional electric generating capacity combines electricity price effects from the Flash-Cut restructuring scenario with the spending and employment effects beginning in 1999 consistent with the construction and operation of coal-fueled generating facility and the transmission facilities discussed above. The analysis assumes that these developments would occur without special public subsidy.

The economic analysis indicates positive effects peaking at about 2,200 jobs state-wide in the year 2000, declining rapidly to less than 600 jobs in 2002 and in the years thereafter. As illustrated on Figure 8-2A and summarized in Table 8-2, the peak year impact on jobs (0.65 percent) and income (0.61 percent) are less than one percent state-wide. The estimated impact on resident population is essentially neutral -- the positive impacts of the additional power plant and mining activity offset the slightly negative state-wide effects of flash-cut restructuring on resident population.

The sector employment effects of this scenario are summarized on Figure 8-2B. The economic analysis indicates significant economic impacts of over 200 additional jobs (including an estimated 140 direct jobs) in the TCPU sector (which includes



Figure 8-2A and 8-2B



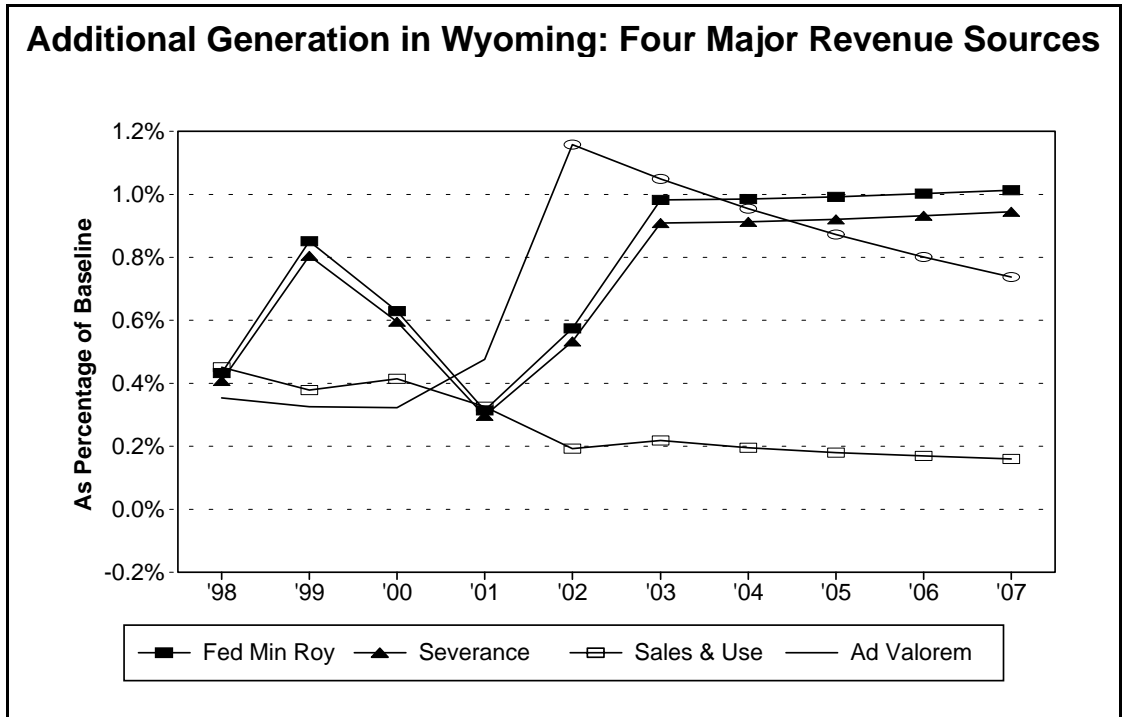
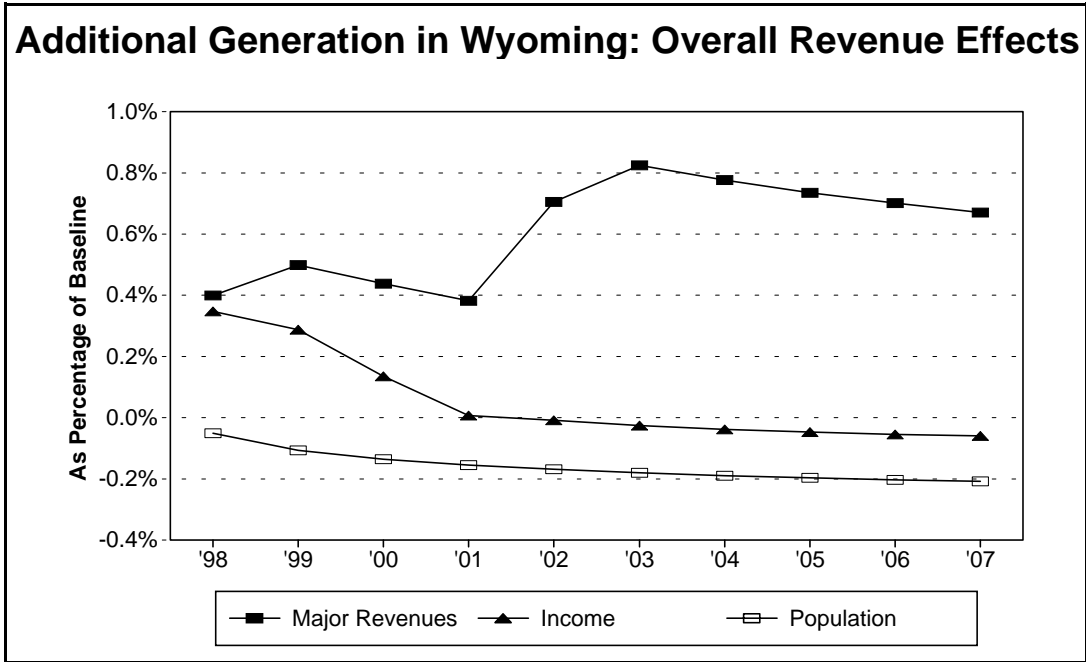
public utilities as well as transportation and communications) after the generating capacity begins operations in year 2002. The impacts on construction jobs occur in the early projection years and are not included in the TCPU sector. It is important to note that the direct additional jobs and income associated with this scenario are likely to be located primarily in a particular subarea of the state -- e.g, the Powder River Basin.

Table 8-2 Economic Impacts of Additional Generating Capacity in Wyoming <sup>[1]</sup>				
	Peak Year Impacts		Avg Year Impacts (1998-07)	
	Scen 1 (1998)	Scen 1+ (2000)	Scen 1	Scen 1+
EMPLOY (JOBS)	0.51%	0.65%	0.12%	0.30%
Mining	0.70%	0.31%	0.21%	0.21%
TCPU	1.07%	0.77%	0.57%	1.16%
Retail Trade	0.78%	0.62%	0.26%	0.37%
Services	0.49%	0.52%	0.09%	0.21%
St & Loc Gov	-0.03%	0.01%	-0.09%	0.03%
Other	0.50%	1.15%	0.07%	0.33%
PERSONAL INCOME:				
Current \$	0.38%	0.52%	0.08%	0.27%
Constant \$	0.54%	0.61%	0.28%	0.42%
POPULATION	-0.03%	0.01%	-0.09%	0.03%
	(FY'99)	(FY'03)		
MAJOR REVENUES:	0.48%	0.98%	0.12%	0.56%
Fed Min Roy	0.85%	0.91%	0.20%	0.71%
Severance Tax	0.80%	0.22%	0.20%	0.66%
Sales Tax	0.26%	0.17%	0.06%	0.24%
Use Tax	0.56%	1.05%	0.17%	0.26%
Ad Valorem Tax	0.32%	0.82%	0.08%	0.65%

<sup>[1]</sup> Assumes the Flash-Cut restructuring scenario

As summarized on Figures 8-3A and 8-3B, the fiscal analysis indicates that the additional generating capacity would have positive impacts on Wyoming's major revenue sources, particularly after the new plant begins operations in 2002. Under the scenario, statewide revenues are increased at greater percentages than jobs or income after the initial projection years. The revenue impacts are generally more positive for ad valorem taxes, severance taxes and federal mineral royalties than for sales and use taxes.

Figure 8-3A and 8-3B



## 9.0 Additional Conclusions and Insights

### 9.1 Electric Industry Perspective

Although the explicit analysis of the potential effects of suppliers or consumers market advantage in an open power generation market was beyond the scope of this Study, this topic possibly poses the largest uncertainty regarding the effectiveness and economic impacts of a competitive power generation market in Wyoming or elsewhere. Similarly, imperfect market mechanisms and other factors which might reduce efficiency of the markets could have significant impact on the realized benefits or costs of restructuring. All else being equal, relatively small deviations from fully competitive market electricity prices could offset the associated price impacts and economic impacts quantified in this Study.

The Study indicates that the range of electricity prices experienced across certified service territories would be significantly reduced in the competitive marketplace. However, price disparities from such factors as higher energy losses experienced to serve highly dispersed consumers would not be eliminated by electric restructuring.

### 9.2 Economic and Fiscal Analysis

The economic and fiscal analyses suggest that the electricity price changes in Wyoming and the rest of the U.S. would result in small -- less than one percent -- initial increases in state-wide economic activity. In general, the impacts peak when price changes first occur and then dissipate within a few years. As assessed in the economic and fiscal models, the price changes affect some economic sectors and revenue bases a bit more than other, but do not cause significant changes in the composition of Wyoming's economy or revenue base.

The electricity price changes in the flash-cut scenario combine three types of economic effects:

- Small percentage reductions in already low electric prices in Wyoming.
- Reductions in electricity prices nation-wide, stimulating the national economy and markets for Wyoming exports for energy, minerals, agriculture and tourism.
- Reductions in Wyoming's relative electricity price advantage.

Based on scenario analyses conducted for the Study, it would appear that the estimated economic and fiscal effects are attributable mainly to the reductions in electricity prices nation-wide. The analysis suggests that economic and fiscal consequences of price changes elsewhere seem to be more significant for Wyoming than relatively small electricity price changes in Wyoming itself.

The study found the Wyoming state-wide average electricity price reductions and associated economic impacts to be relatively small. This is not to say that Wyoming

restructuring policy has no effect on Wyoming households, businesses and public finance. The cost of electricity is a much larger share of income for lower-income households and for households which use electricity rather than natural gas for space and water heating. The cost of electricity is a more important cost of production for some businesses than for others. Some businesses are better positioned to substitute other fuels for electricity than are others. Some businesses and households are more able to move to avoid higher electricity prices or to take advantage of lower prices. Also, as mentioned in the previous subsection, the state-wide price effects considered in this assessment would vary among Wyoming communities and sub-areas.