



**Kansas City
Board of Public Utilities**



FORECASTING THE FUTURE ELECTRICITY SUB-COMMITTEE JULY 3, 2008

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Section One

BPU's Future Generation Needs



BPU's Future Generation Needs

- Broad summary of 6 years worth of extensive planning work executed by the BPU
 - Complexity, volatility and uncertainties describe today's electric utility industry
 - Resource planning is continually updated to reflect rapid evolutions
 - This planning information subject to further change and should not be used or construed to represent a singular, definitive direction for the future of the BPU
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Integrated Resource Planning

- 2003 Electric Supply Master Plan Recommendations
 - Effort included a comprehensive evaluation of future electric supply needs and potential resources to meet needs
 - Addition of a Peaking Gas Turbine
 - ✓ Installed 2006
 - Addition of a Base Load 235 Mw Coal Unit in 2012
 - ✓ Diligently studied but plans put on indefinite hold
 - Use Purchased Power to bridge the gaps in energy supply while new units are under development
 - ✓ Active in the bilateral energy market and the SPP's new EIS Markets.
 - ✓ Transmission constraints have inhibited BPU's ability to competitively procure required energy from other utilities.
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Integrated Resource Planning

- 2006-2007 Electric Supply Planning Update
 - Rapid industry changes required a reevaluation of the 2003 supply planning study which confirmed that a 235 Mw base load coal fired unit addition was still needed in 2012
 - With confirmation, BPU initiated efforts to develop a base load coal fired project
 - Detailed studies, preliminary design work, scheduling, project planning, development of more accurate cost estimates, performance of complex modeling and construction permit application preparation
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Integrated Resource Planning

- Need for the base load coal fired unit remains, the project was put on hold in 2007
 - Several factors resulted in delay of further development of the base load project
 - Construction cost escalations and volatility
 - Estimated cost of a 235Mw coal-fired project - \$700,000,000
 - Legislative effort to define future coal fired permit requirements
 - Significant uncertainty on the future impacts of state or federal carbon legislation
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Population Growth



Wyandotte County, Kansas 1990 Census Tracts

Population Change

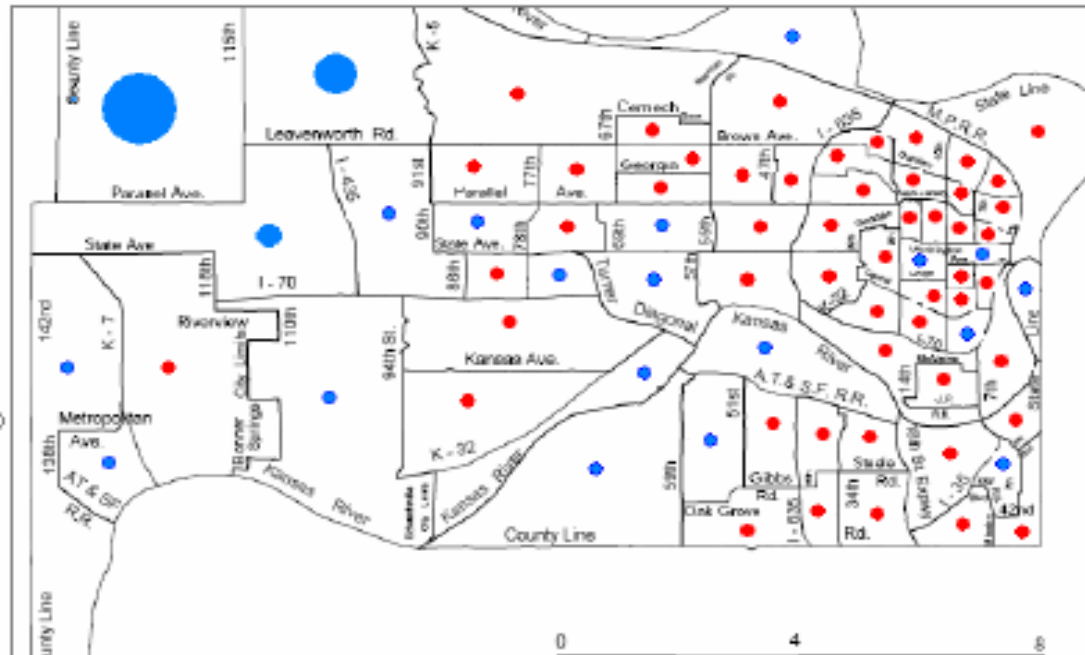
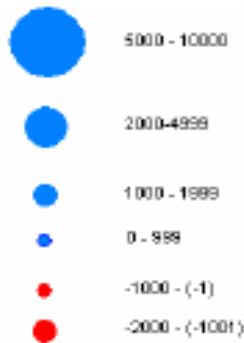


Figure 2-2
Projected Population Change in Wyandotte County 2000-2030



**Table 2-2
Forecast of Net System Peak Demand and Energy Use**

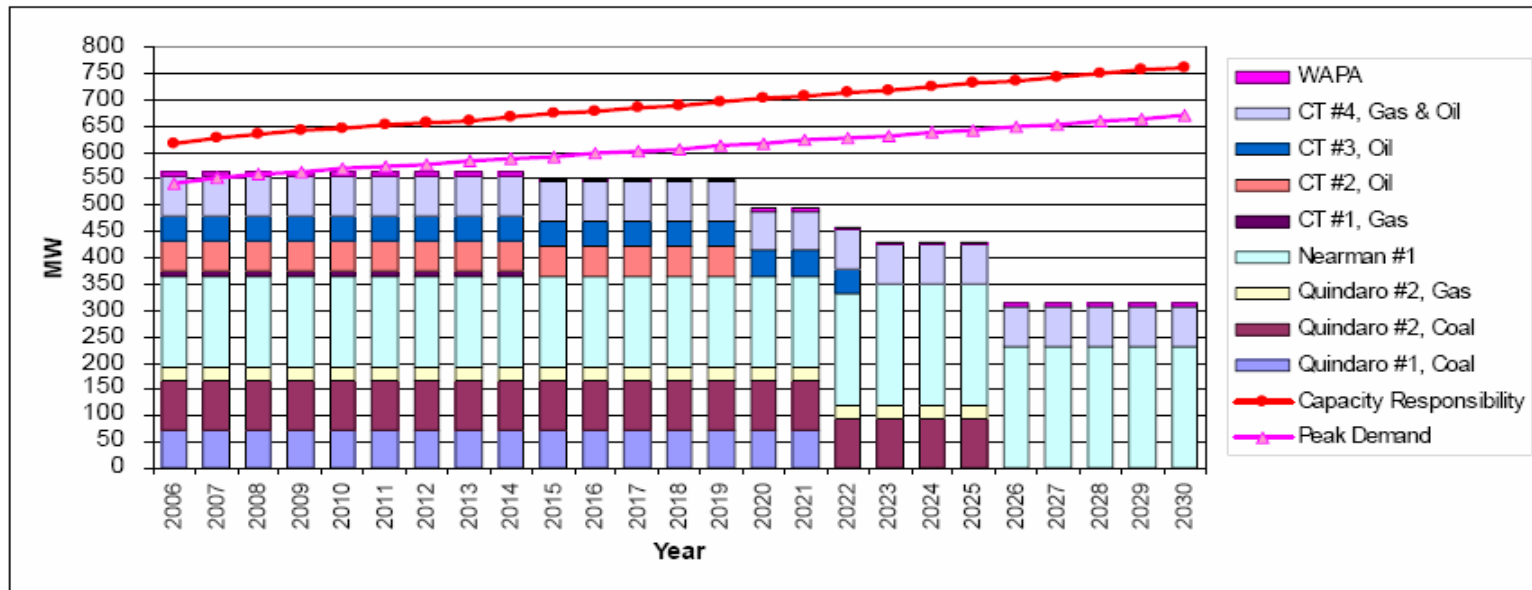
Year ⁽²⁾	System Net ⁽¹⁾		Growth (%)	Load Factor (%)	
	Peak Demand (MW)	Total Energy (GWh)			
2002	492	2,482	-	57.6	
2003	520	2,430	-2.11	53.3	
2004	491	2,529	7.20	60.7	
2005	501	2,611	1.18	56.2	
Projected ^(3,4)					
Year ⁽²⁾	Extreme Weather	Normal Weather	Total Energy (GWh)	Growth (%)	Load Factor (%)
2006	542	523	2,682	1.77	56.5
2007	552	532	2,729	1.74	56.4
2008	557	537	2,754	0.92	56.4
2009	563	542	2,779	0.91	56.4
2010	568	548	2,804	0.91	56.4
2011	573	552	2,827	0.81	56.3
2012	577	557	2,849	0.80	56.3
2013	582	561	2,872	0.80	56.3
2014	587	566	2,895	0.79	56.3
2015	592	571	2,918	0.79	56.3
2016	597	575	2,941	0.79	56.3
2017	602	580	2,964	0.79	56.2
2018	607	585	2,988	0.79	56.2
2019	612	590	3,011	0.80	56.2
2020	617	595	3,035	0.80	56.2
2021	622	600	3,060	0.79	56.2
2022	627	605	3,084	0.80	56.1
2023	632	610	3,109	0.80	56.1
2024	637	615	3,133	0.80	56.1
2025	643	620	3,158	0.80	56.1
2026	648	625	3,184	0.80	56.1
2027	653	630	3,209	0.80	56.1
2028	659	635	3,235	0.80	56.0
2029	664	641	3,261	0.80	56.0
2030	670	646	3,287	0.80	56.0

⁽¹⁾Net System energy is the sum of system generation plus off-system purchases less off-system sales.
⁽²⁾Peak numbers in 2002 through 2005 are actual with a plus 14 MW adjustment in 2002 to account for GM summertime shutdown.
⁽³⁾Forecast peak demand estimates are based on a 54 % load factor for extreme weather conditions and a 56 % load factor for normal weather conditions.
⁽⁴⁾Residential energy use is based on the 2004 MARC forecast of Wyandotte County households.



Load & Resource Balances

2007

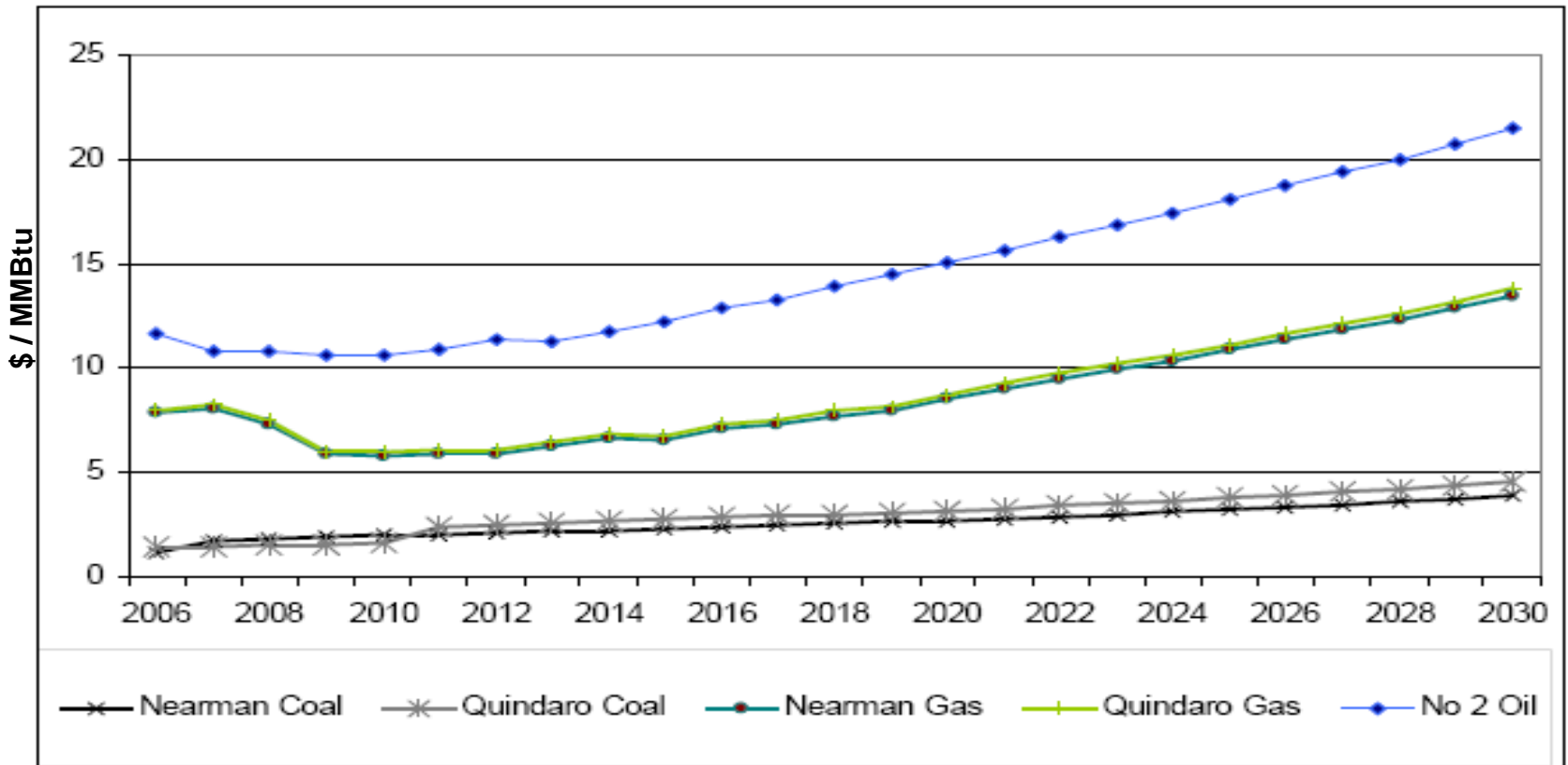


Resource Capacities:

- WAPA - 5 MW
- CT 4 - 75 MW
- CT 3 - 49 MW
- CT 2 - 56 MW
- CT 1 - 12 MW
- Nearman Unit 1 (BPU share) - 174-232 MW
- Quindaro Unit 2 - 118 MW
- Quindaro Unit 1 - 72 MW



Figure ES-2
Comparative Fuel Price Forecasts Delivered to BPU Generators





Resource Cost Comparisons

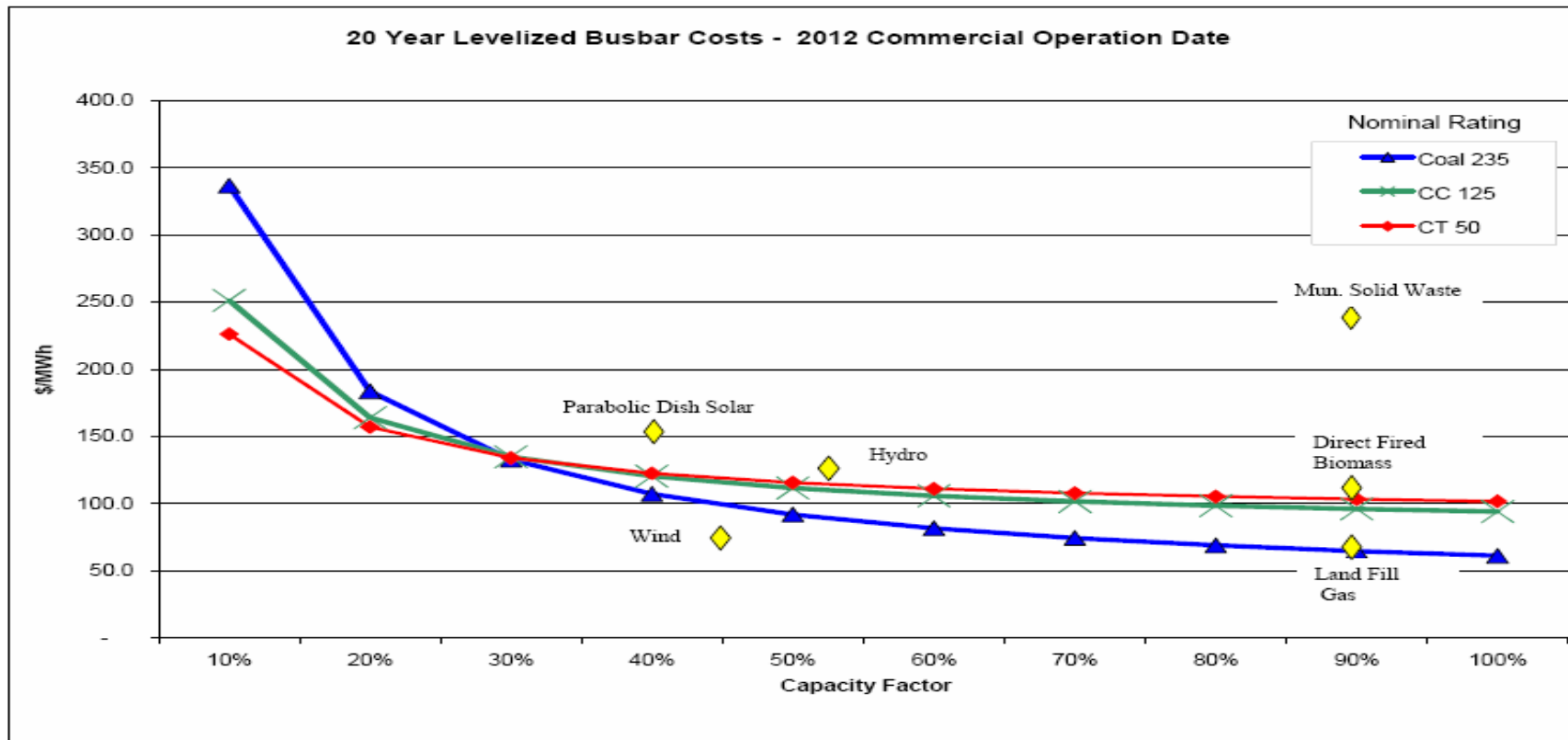


Figure 4-7
20 Year Levelized Busbar Costs 2012 Commercial Operation Date - Conventional and Renewable Options



Figure 5-4
\$/MWh Comparative Revenue Requirements - Base and Combined Cycle Plans

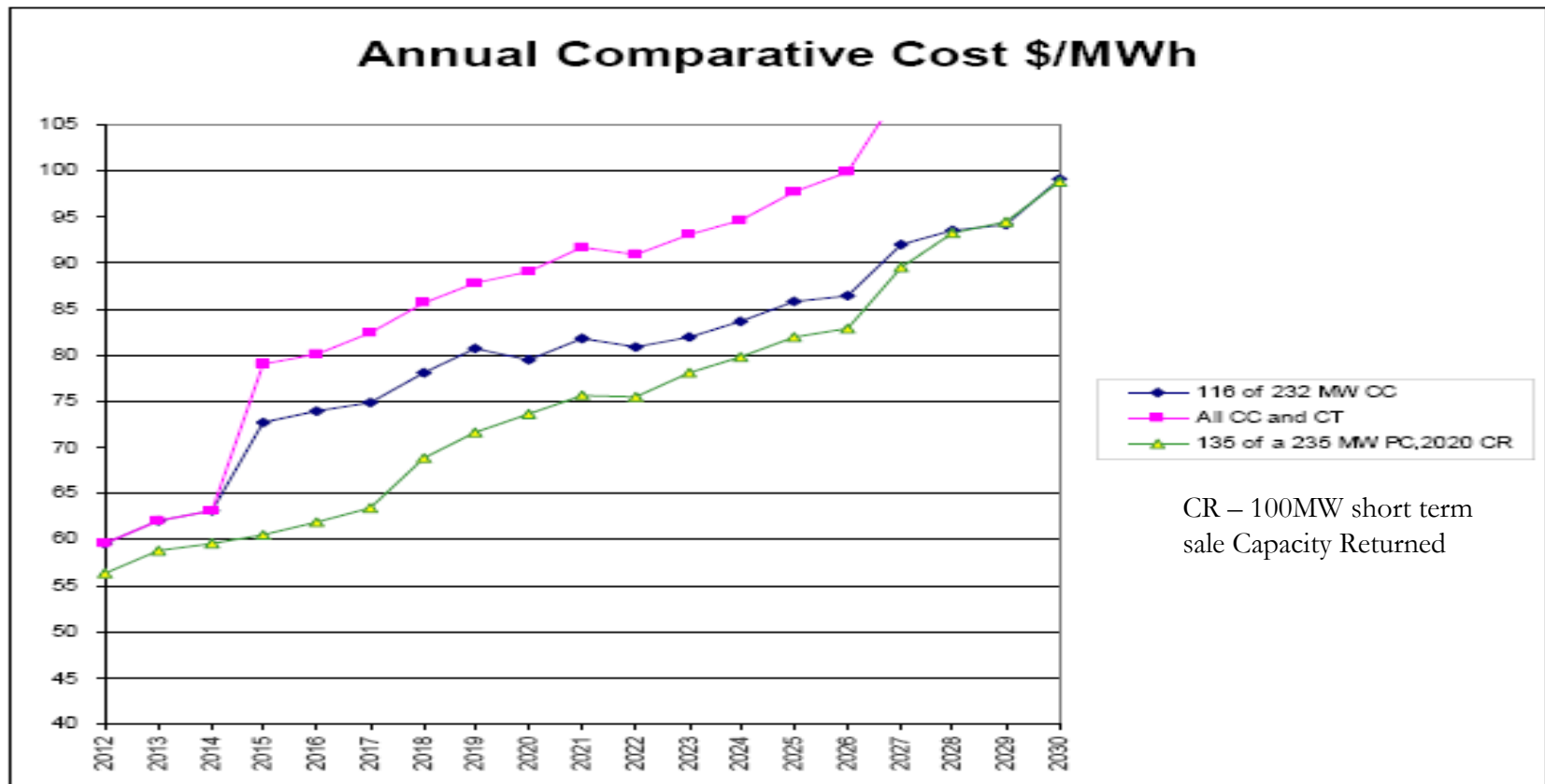




Figure 5-3
\$/MWh Comparative Revenue Requirements - Base and Solely Owned PC Plans

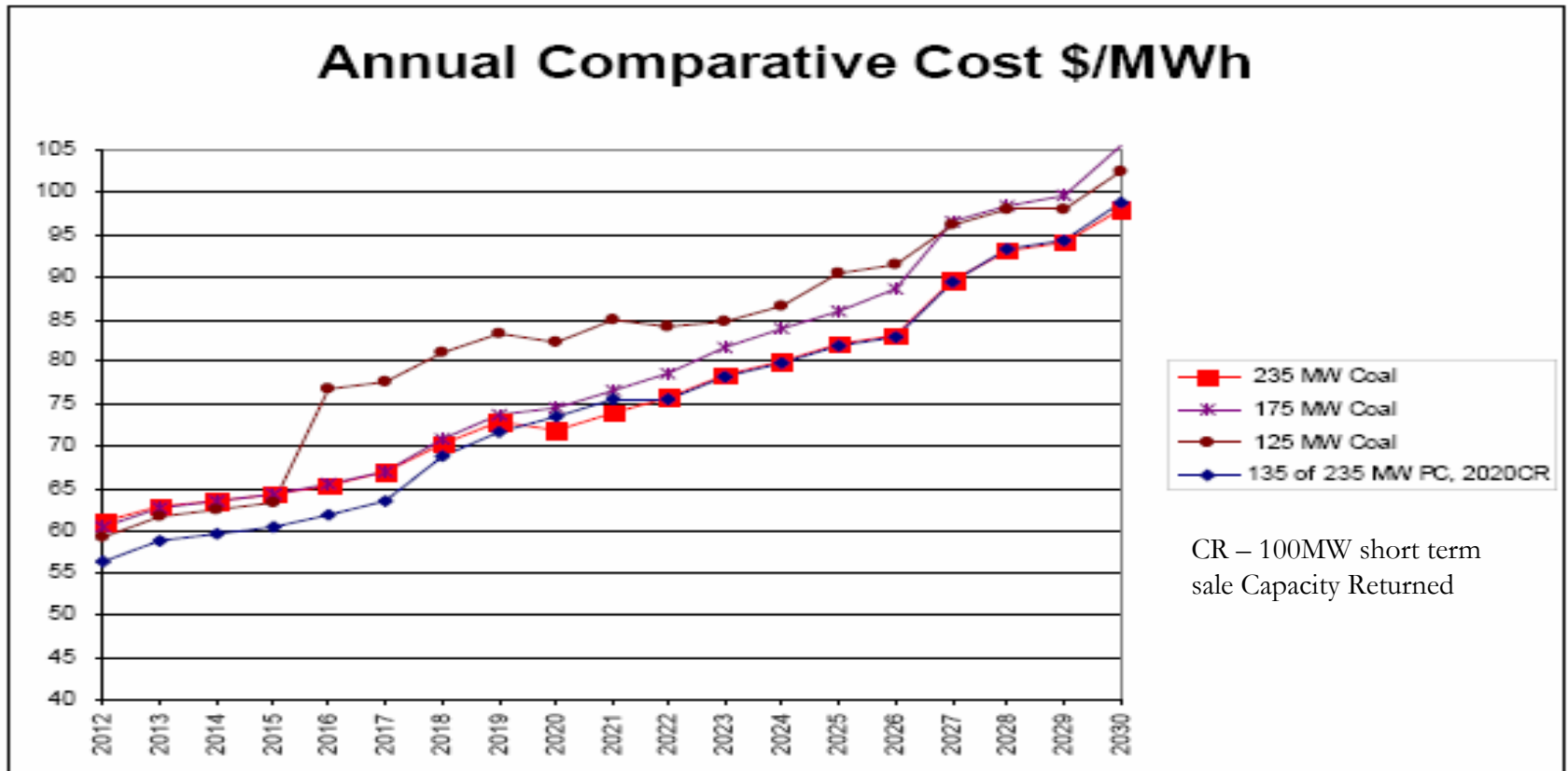




Figure 5-9
Percent Deviation from Base Plan - Combined Cycle Plans

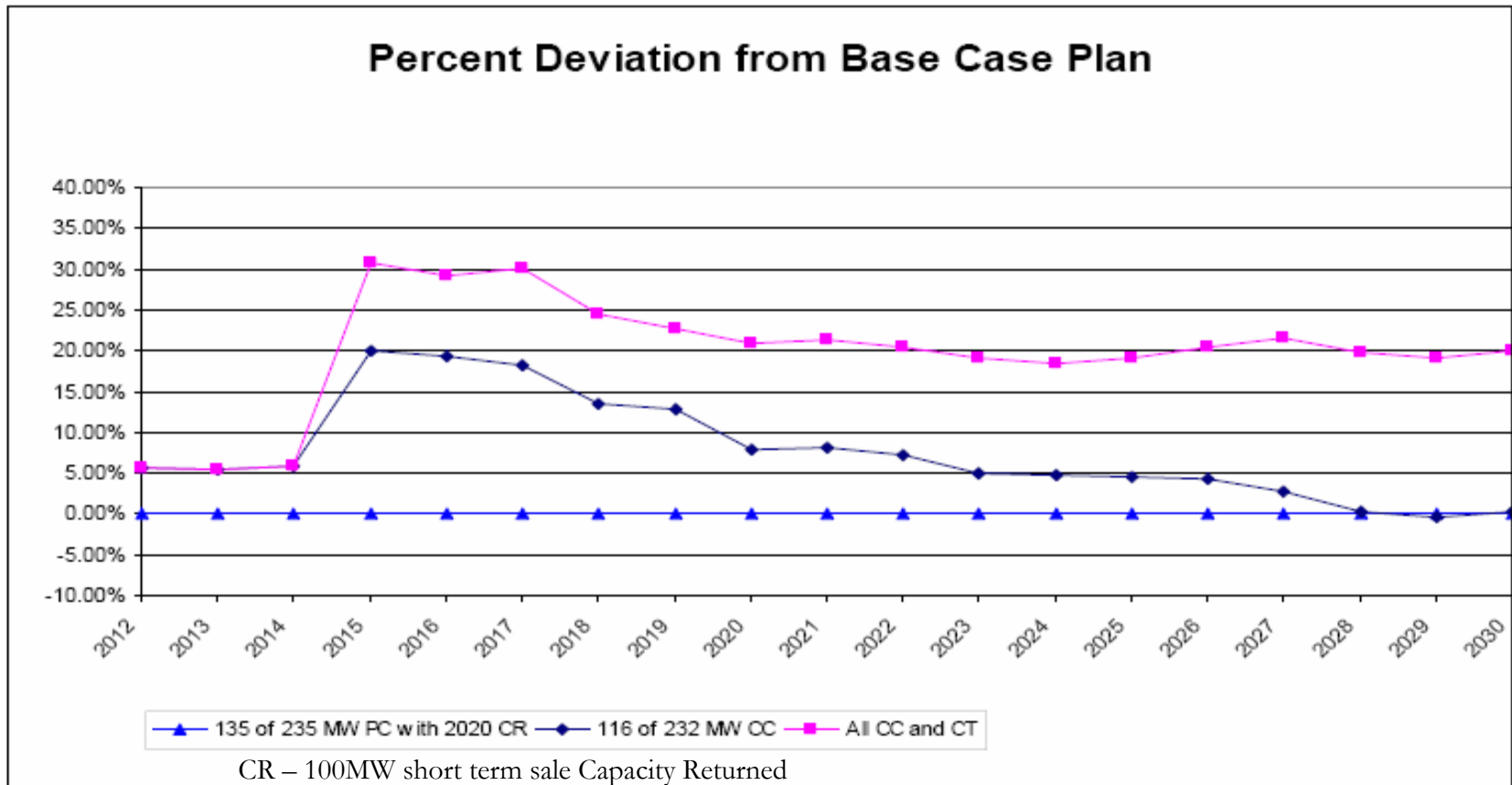
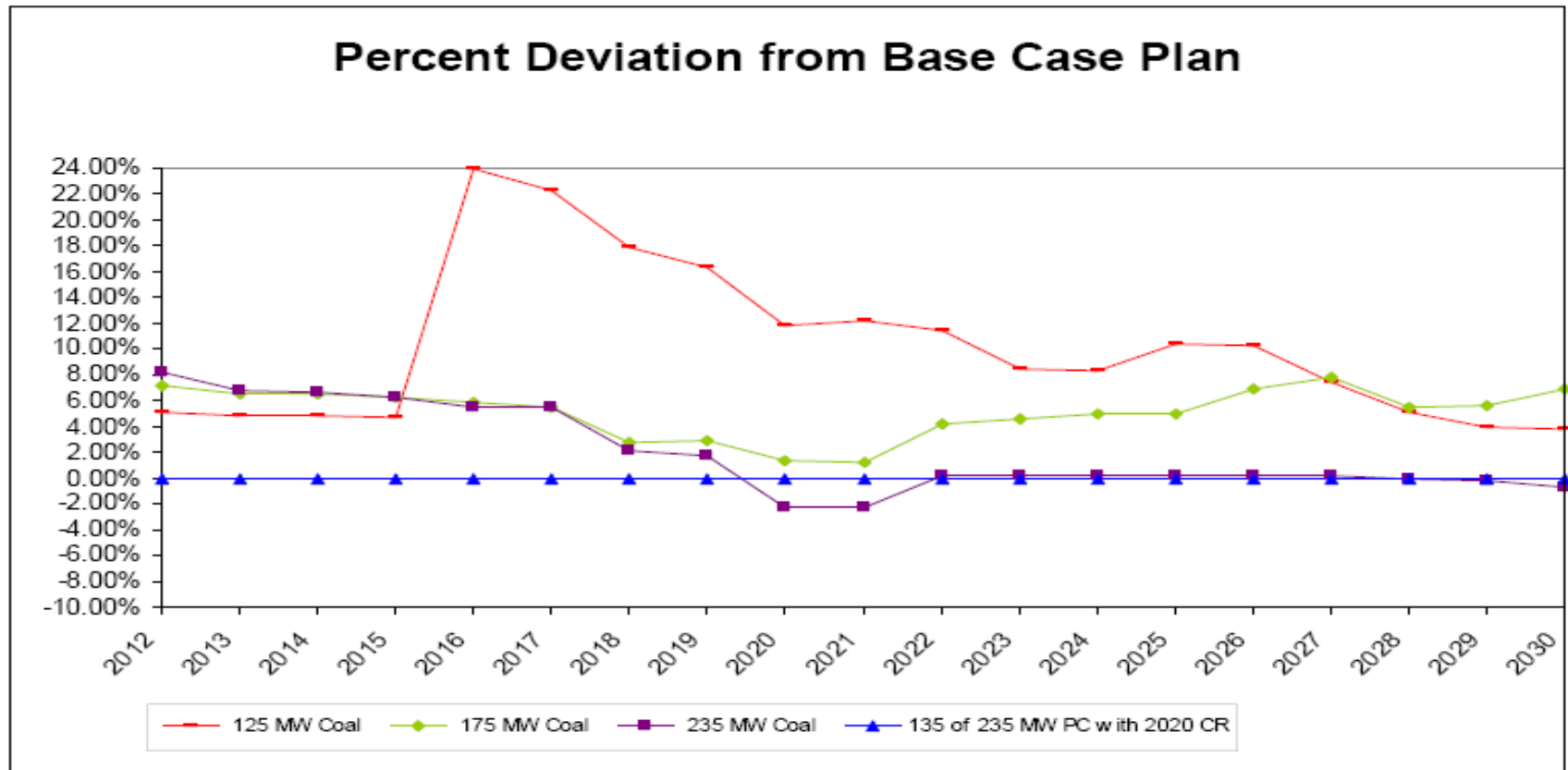




Figure 5-8
Percent Deviation from Base Plan - Solely Owned PC Plans



CR – 100MW short term sale Capacity Returned



Sensitivities

- The risk scenarios to which each of the key plans was subjected are listed below:
 - Loss or gain of a very large customer
 - Lower long-term gas prices and higher long-term coal prices
 - Lower SO₂ emission allowance prices and a new NO_x cap
 - Thirty percent higher capital costs
 - Higher and lower spot market prices
 - A carbon tax



Table 5-9
Sensitivity/Risk Ranking of Key Plans

Sensitivity/Risk Scenario	Key Expansion Plans				
	135 of 235 MW PC, CR2020	175 of 235 MW PC	175 of 235 MW PC, CR2020	235 MW PC	116 of 232 MW CC
Base	1	3	2	4	5
High Load	1	3	2	4	5
Low Load	1	2	3	4	5
High Coal Price	1	3	2	4	5
Low Gas Price	1	2	3	4	5
Low SO ₂	1	3	2	4	5
GED NO _x Price	1	3	2	4	5
Carbon Tax	1	2	3	4	5
High Capital Costs	1	3	2	4	5
High Spot Market Prices	1	3	2	4	5
Low Market Prices	1	3	2	4	5
Carbon Tax and Spot Market Adjustment	1	4	2	3	5
Eastern Coal	1	3	2	4	5
Low Load and High Coal Price	1	4	2	3	5
High Capital Costs and Carbon Tax with Market Adjustment	1	2	3	5	4
Sum of Rank	12	34	27	47	60



Figure 5-14
Risk Sensitivity of Key Plans

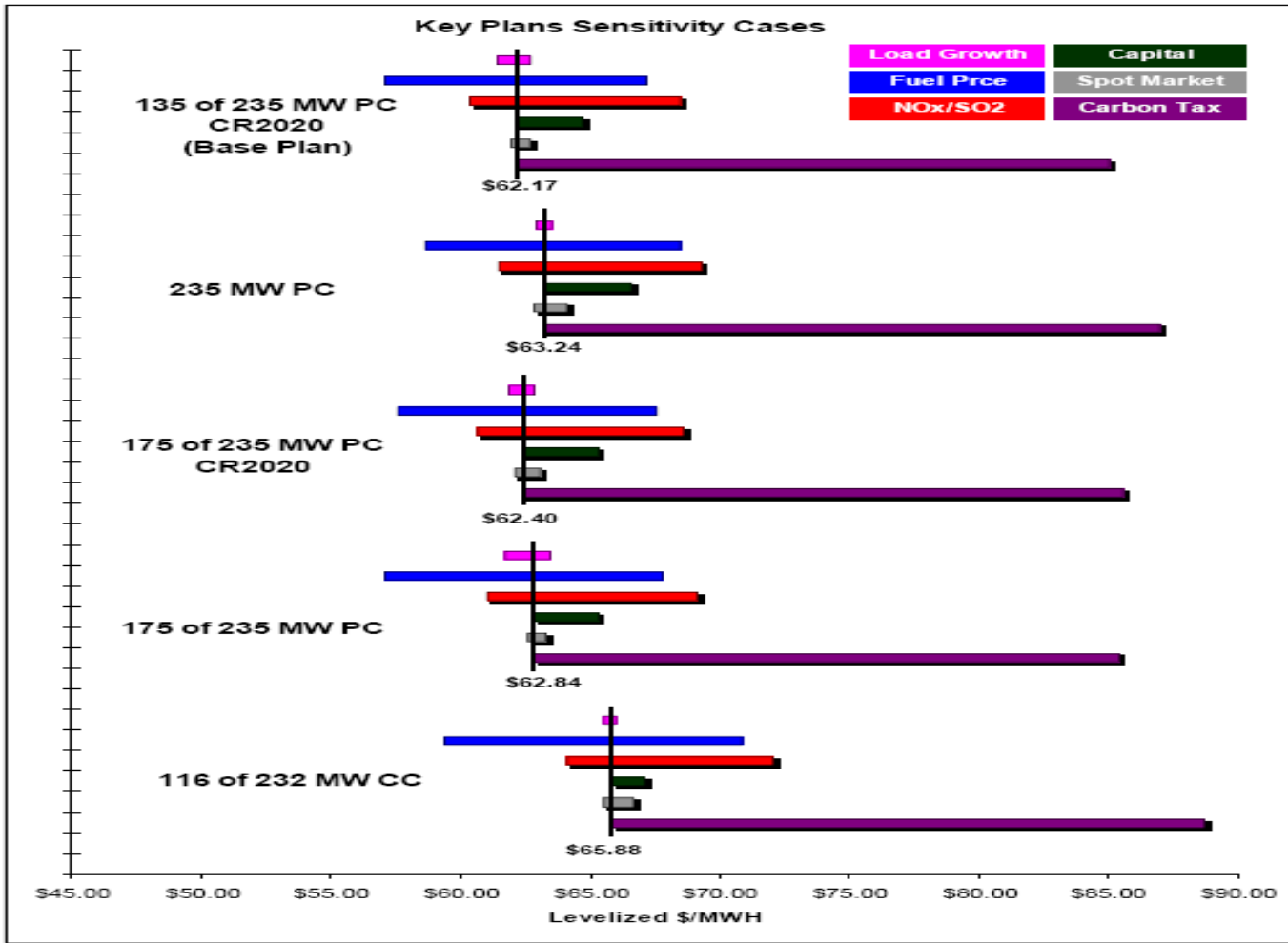
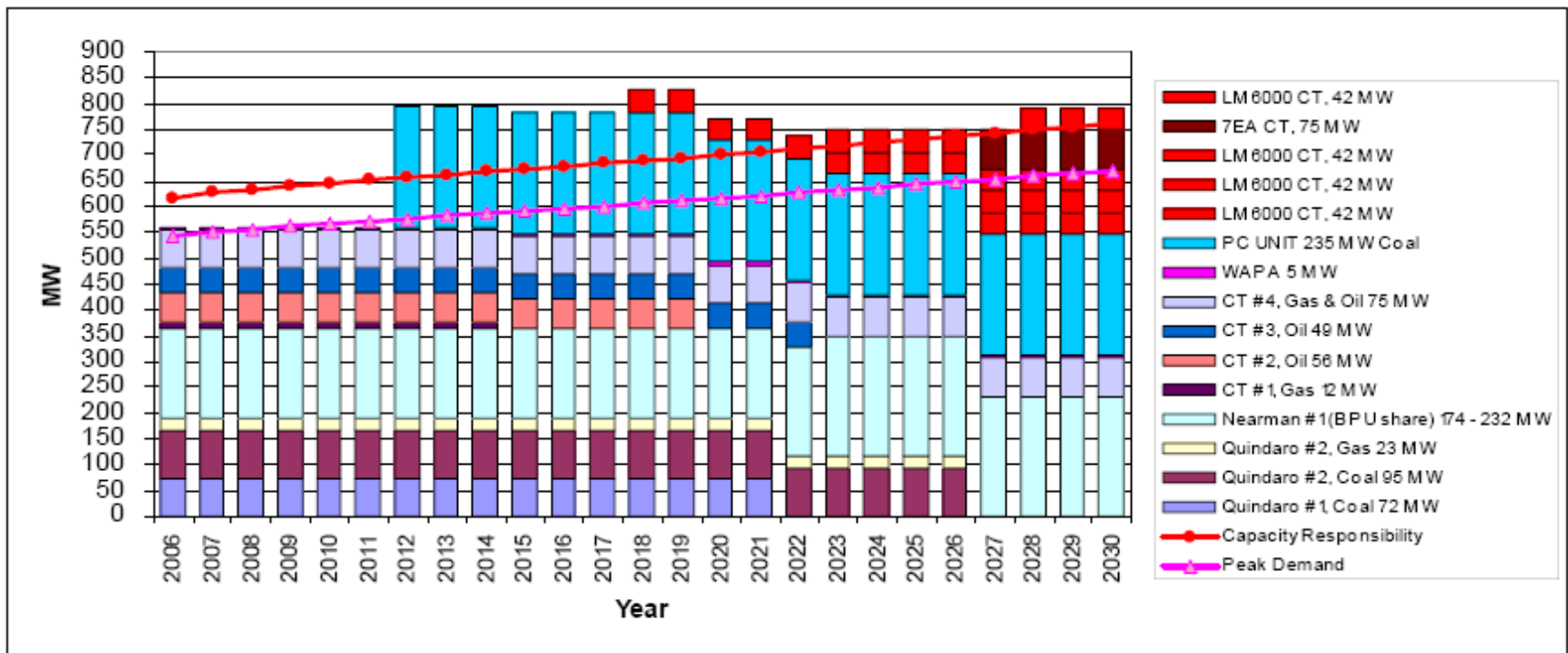




Figure 4-8
Forecast Capacity Balance - Base Case Plan, 235 MW PC, 100 MW Firm Sales with Capacity Return in 2020





Section Two

Current Resource Planning Status

Natural Gas, Wind & Energy Efficiency



Load & Resource Balances

2008

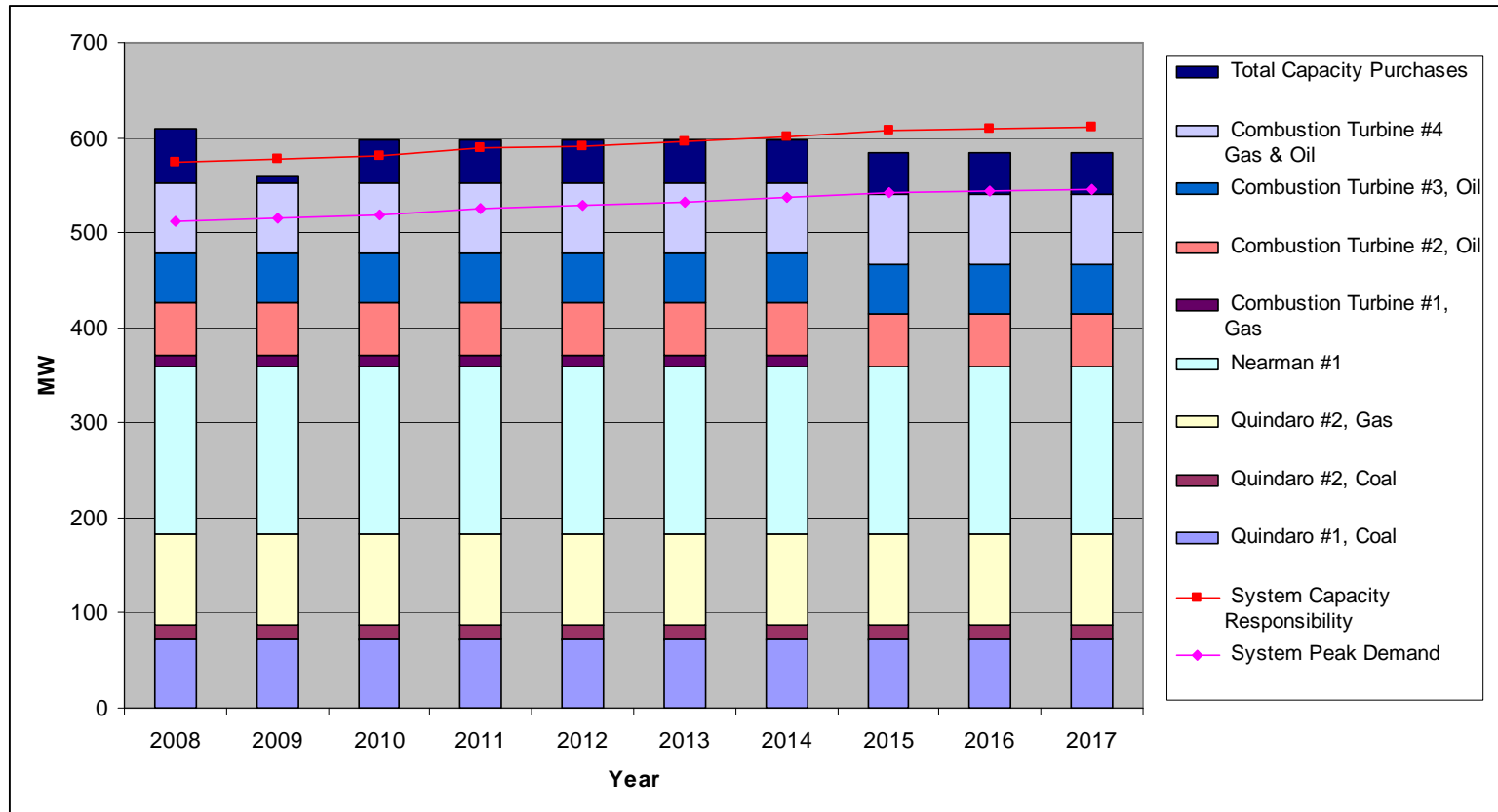
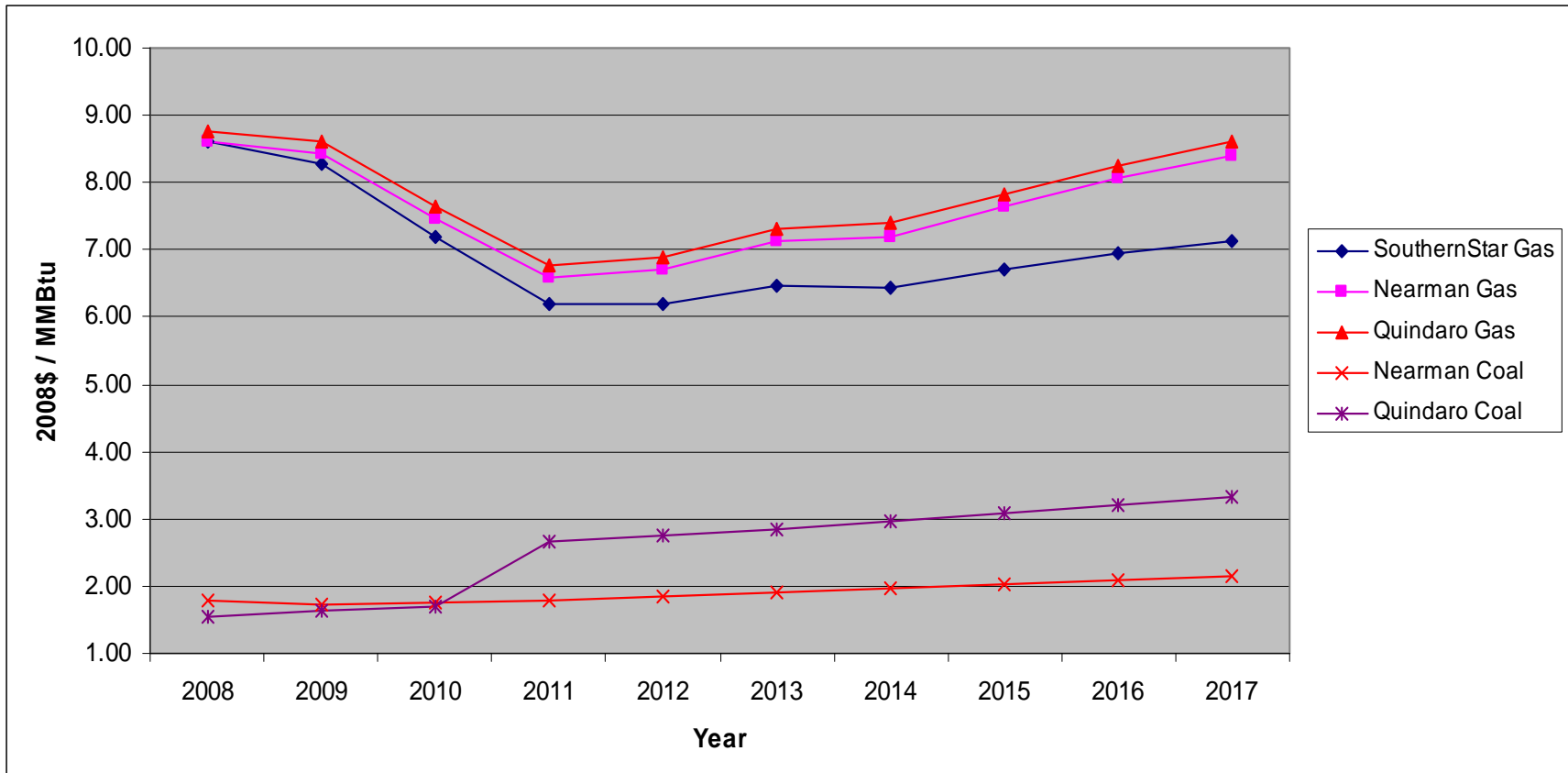




Figure 5-1
Annual Average Fuel Price Forecasts Delivered to BPU
Generators





Gas Generation Alternatives

- LM6000PC-Sprint Simple Cycle Combustion Turbine (SCCT)
- 2x1 LM6000PC-Sprint Combined Cycle Combustion Turbine (CCCT)
- 7EA SCCT
- 1x1 7EA CCCT
- 2X LM2500 SCCT



Sensitivities

- 35 MW of additional wind generation capacity
- DSM Initiatives -11 MW for 4 hours and 21MW for 8 hours
- High & Low Load
- High CO2 tax
- High & low fuel and market conditions
- No Market Purchases
- No AQC on Q1, Q2 & N1
- Scrubber and Fabric Filter on Q2



Table 5-4
Sensitivity / Risk Ranking of Alternative Plans

	Q0-A	Q0-B	Q0-C	Q0-D	Q0-E	Q0-F	Q1-A	Q1-B	Q1-C	Q1-D
	7EA CT in 2011 convert to CC in 2012 118 MW	2 x LM 6000 CT in 2011, 2015 & CT4 CC in 2011 130 MW	2 x LM6000CT in 2011 convert one to CC in 2013 160 MW	7EA CT in 2011 & LM6000 CT in 2013 118 MW	3 x LM6000 CT in 2011 & 2013 130 MW	LM6000CT in 2011 & 7EA CT in 2013 118 MW	7EA CT in 2011 75 MW	LM6000 CT in 2011 43 MW	2 x LM2500 CT in 2011,2013 43 MW	CT4 to CC in 2011 44 MW
Base Case	9	10	8	4	7	5	3	1	2	6
Lose Large Customer	8	10	9	4	6	6	3	1	2	5
Gain Large Customer	9	10	8	5	7	6	3	1	2	4
High NG and MCP	9	10	8	5	7	6	3	1	2	4
Low NG and MCP	5	8	3	1	4	2	9	6	7	10
High Carbon Tax	7	10	3	4	8	5	6	1	2	9
No Market Purchases	7	8	5	10	6	9	4	1	2	3
35 MW Additional Wind	9	10	8	4	6	7	3	1	2	5
DSM 21 MW for 8 hour Program	9	10	8	4	7	5	3	1	2	6
DSM 11 MW for 4 hour Program	9	10	8	4	7	6	3	1	2	5
DSM 11 and 4 MW Programs	9	10	8	4	7	5	3	1	2	6
No AQC on Q1, Q2 and N1	8	10	9	5	7	6	3	1	2	4
Scrubber and FF on Q2 in 2014	9	10	8	4	7	6	3	1	2	5
Sum of Rank	107	126	93	58	86	74	49	18	31	72
Combined Rank	9	10	8	4	7	6	3	1	2	5



Gas Generation Conclusions

- No current fit for Combined Cycle
- Add 25-75 Mw of Simple Cycle in 2011
- Continue to track developments in the industry and adjust future generation addition plans accordingly

Smoky Hills Wind Farm 25 MW to BPU



Coal and Wind Working Together





Joining the Smoky Hills Project

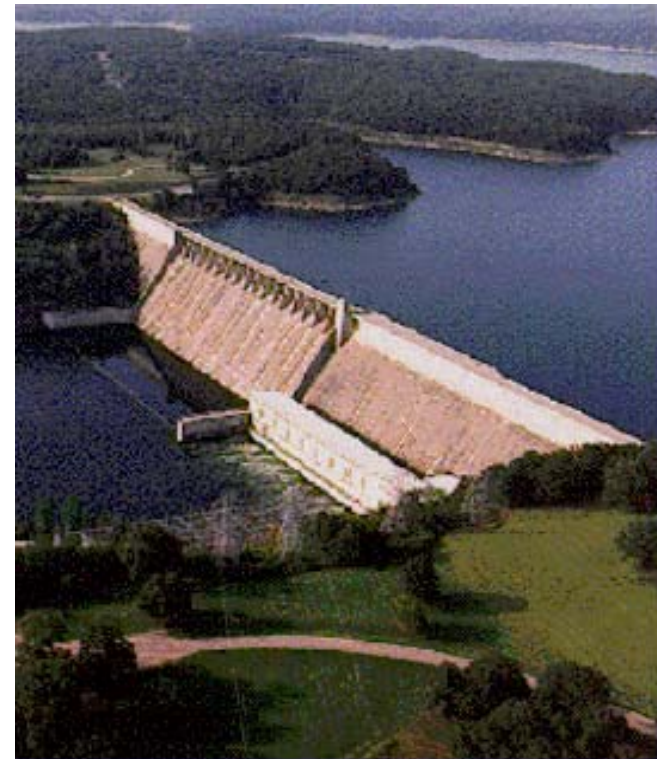
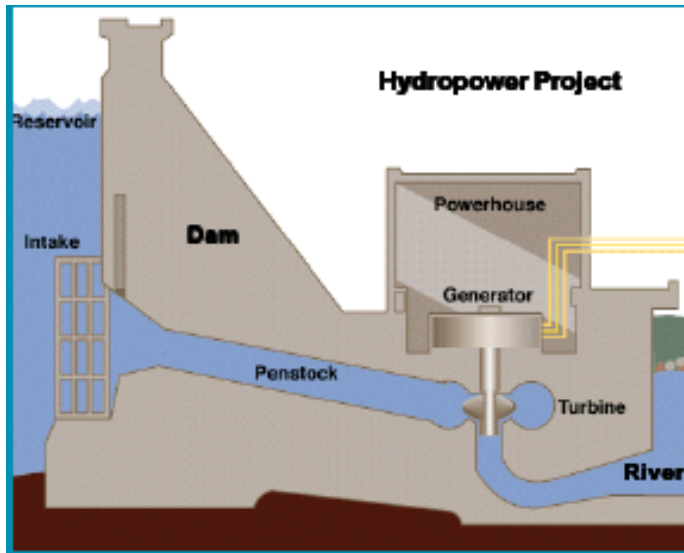
- Location advantage - better wind resource
- Financing (private) - Production Tax Credits & accelerated depreciation
- Size (> 100MW) - economies of scale
- Development time (faster)
 - site studies
 - site permits
 - landowner leases



Smoky Hills Project Benefits

- Long-term contract
 - Fixed price
 - No up front capital costs
 - Reduces future air emission, water use/discharge and solid waste disposal
 - Hedge against high market purchase prices due to high gas prices of the units on the margin
 - Saves ratepayers money
-

SWPA Hydro Contract Extension 39 MW





Where BPU Goes From Here

- While ever evolving at this time, BPU's plan is:
 - Maintain all existing generation
 - Install 25-75 Mw new simple cycle combustion turbine
 - Base load coal under consideration – it's still needed, but timing unknown
 - Expand DSM and Demand Response programs
 - Environmental upgrades
 - Continue to pursue:
 - Additional Wind
 - Landfill gas
 - Purchased Power contracts
 - Future joint efforts with other utilities
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