



Organization of MISO States

Summary Statistics of Future Uncertainties

Prepared by
The OMS Modeling Workgroup

Fourth CARP Meeting
Carmel, IN
April 28, 2009

Responses: Ten respondent spreadsheets were included in this summary

Completeness: Not all respondents filled all the cells in the spreadsheet

Summary Statistics: For most of the variables considered, the average reference, the average low, the average high, the lowest low and the highest high were computed.

Discussion points: Outliers among the responses

Next steps:

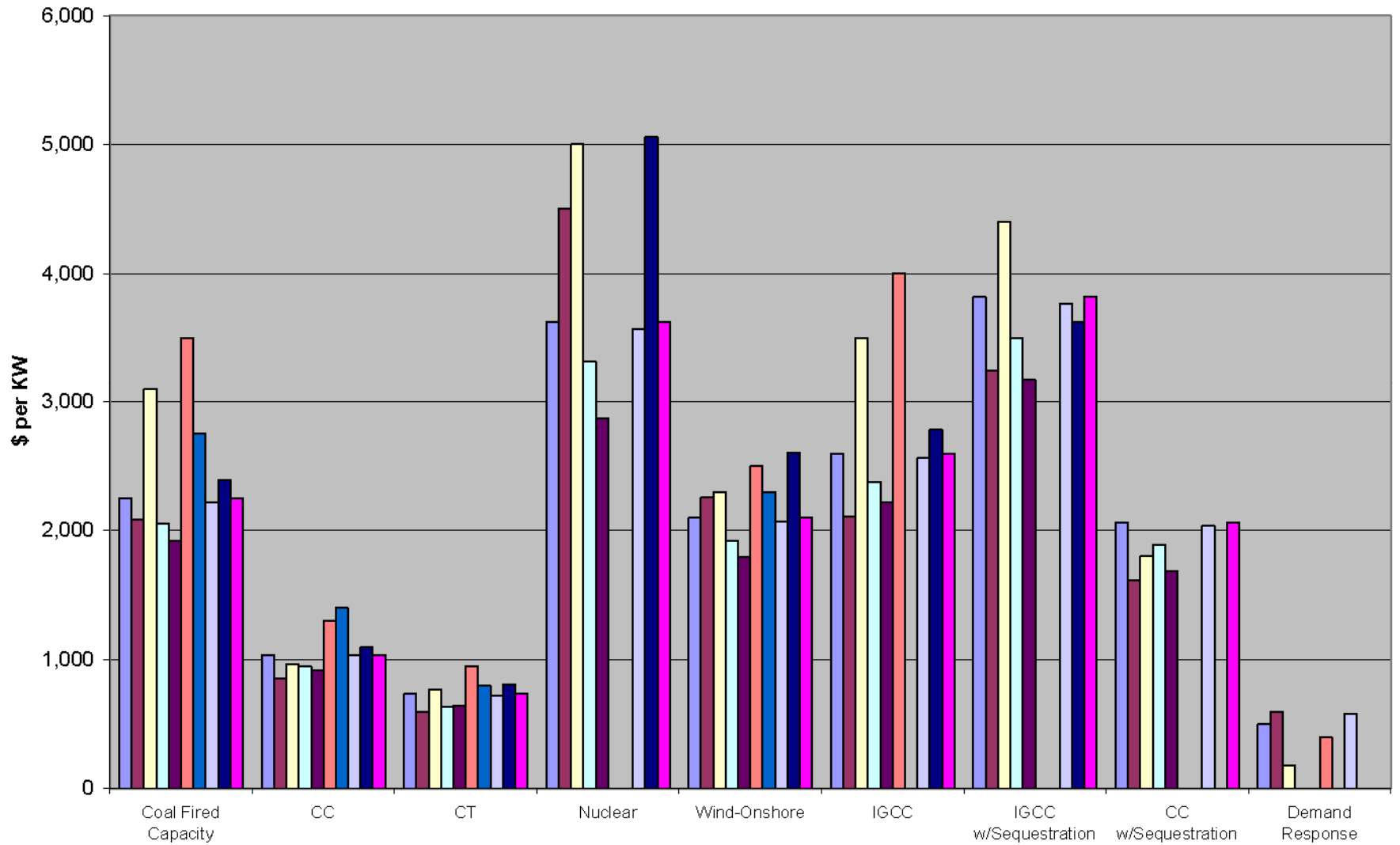
- Extracting alternative futures from the summary statistics spreadsheet for MISO to run.

- Agreeing to specific penetration rates for wind and to specific levels of CO2 reductions for MISO to run.

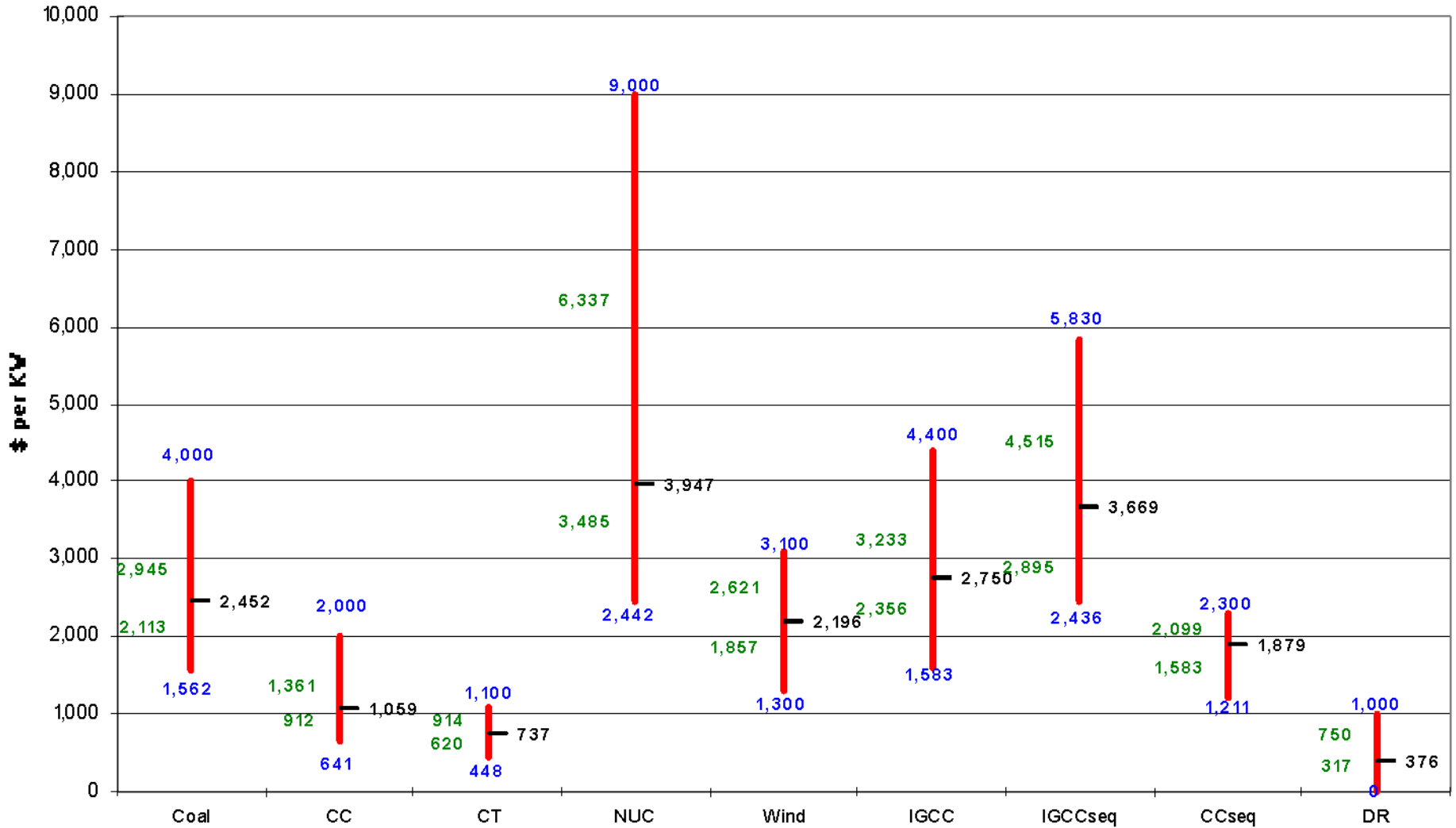
Summary Statistics

Uncertainty	Unit	Lowest Low	Average Reference	Highest High	Fuel Prices				
					Gas	Oil	Coal	Uranium	
Capital Costs					(\$/MMBtu)	3.75	7.45	20.00	
Coal Fired Capacity	(\$/KW)	1,562	2,452	4,000	(\$/MMBtu)	6.25	10.86	15.37	
CC	(\$/KW)	641	1,059	2,000	(\$/MMBtu)	1.30	2.21	5.00	
CT	(\$/KW)	448	737	1,100	(\$/MMBtu)	0.40	0.80	2.00	
Nuclear	(\$/KW)	2,442	3,947	9,000	Emissions				
Wind	(\$/KW)	1,300	2,196	3,100	SO ₂	(\$/ton)	50	413	3000
IGCC	(\$/KW)	1,583	2,750	4,400	NO _x	(\$/ton)	450	1786	7000
IGCC w/Sequestration	(\$/KW)	2,436	3,669	5,830	CO ₂	(\$/ton)	0	33	143
CC w/Sequestration	(\$/KW)	1,211	1,879	2,300	Hg	(\$/ton)		42533352	
Demand Response	(\$/KW)	0	376	1,000					
Storage	(\$/KW)		2,250		Economic Variables				
Photovoltaic	(\$/KW)	4,529	6,434	7,548	Discount Rate	%	5.00	8.39	15.00
Biomass	(\$/KW)	2,825	4,013	5,500	Inflation Rate	%	0.00	2.91	6.50
Hydro	(\$/KW)	1,682	2,389	2,803					
Wind-Offshore	(\$/KW)	2,888	4,104	4,814	Wind Penetration				
Distributive Generation-Peak	(\$/KW)	1,234	1,753	2,056	Midwest ISO	%	5.00	5.00	10.00
Demand and Energy					National	%	0.00	5.00	10.00
Demand Growth Rate	%	-4.00	1.03	4.00					
Energy Growth Rate	%	-2.00	1.24	3.50	Carbon Reduction Requirements from Baseline Level				
Demand Response Penetration as % of peak	%	0.00	3.31	0.00	CO ₂	%	0.00	10.00	20.00
Energy Efficiency	%	1.95	1.46	1.00	Storage				
					Penetration	% of installed Wind MW		25.00	

Capital Costs

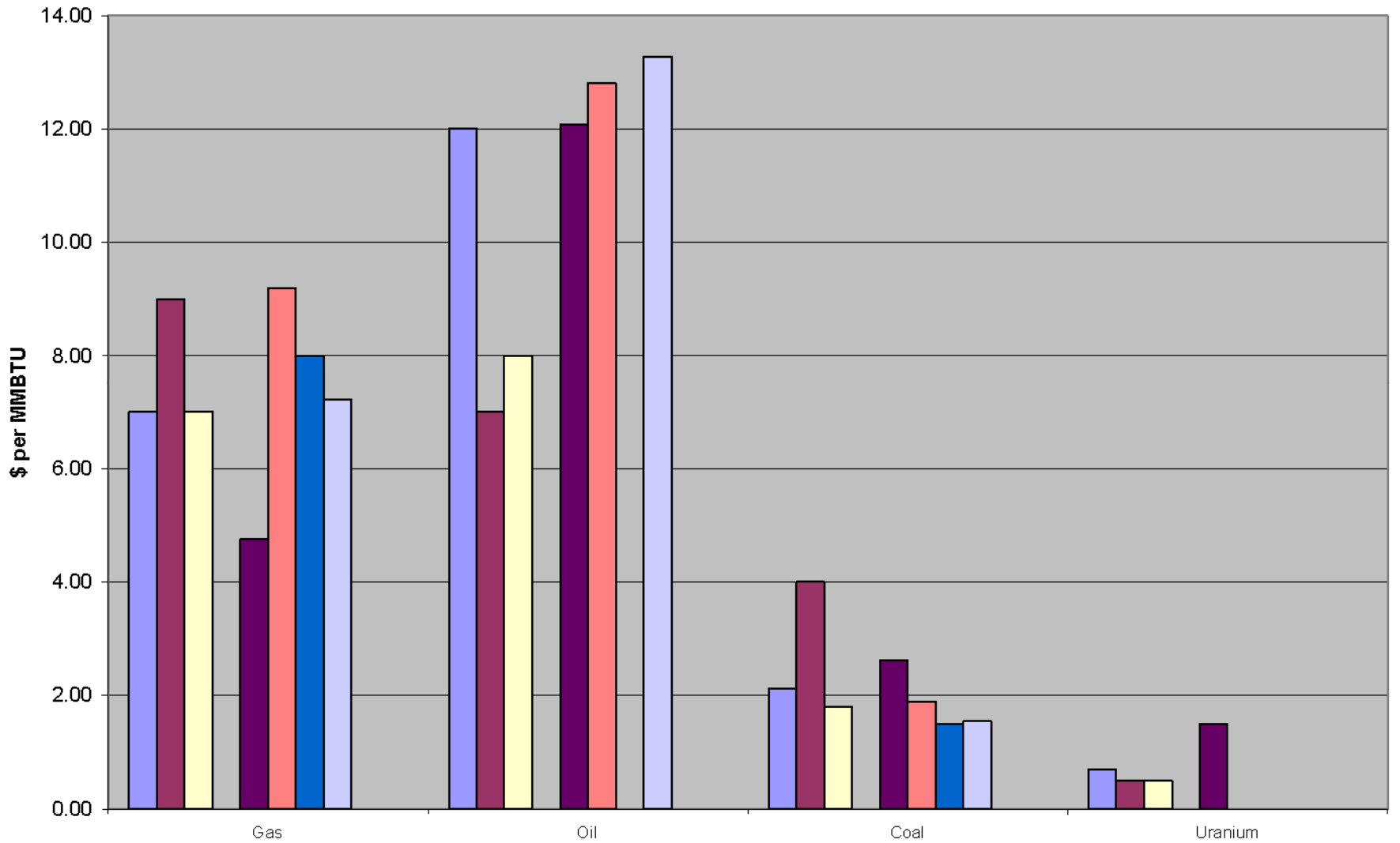


Capital Costs

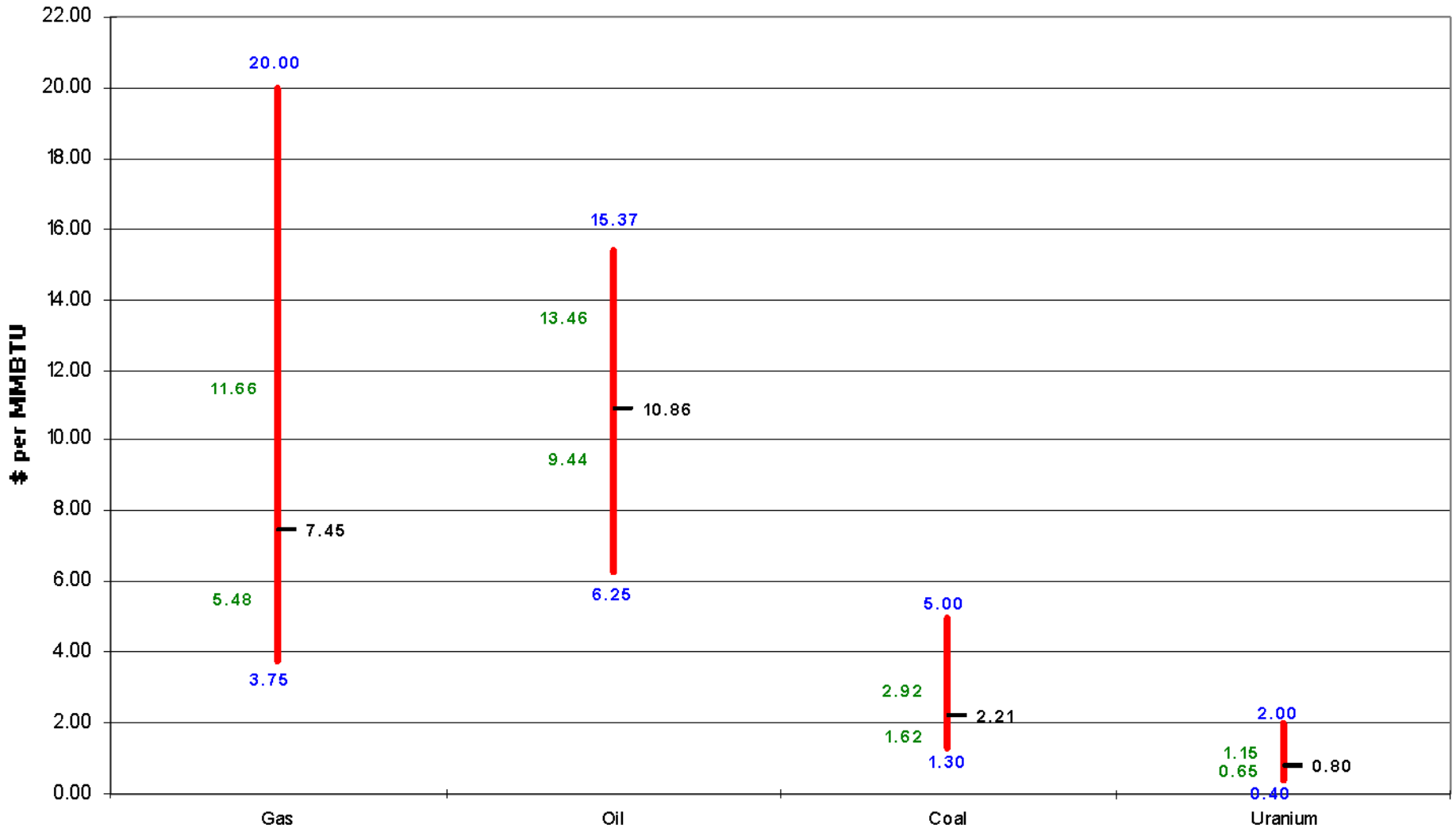


High Low - Mean High Mean Low Mean

Fuel Prices

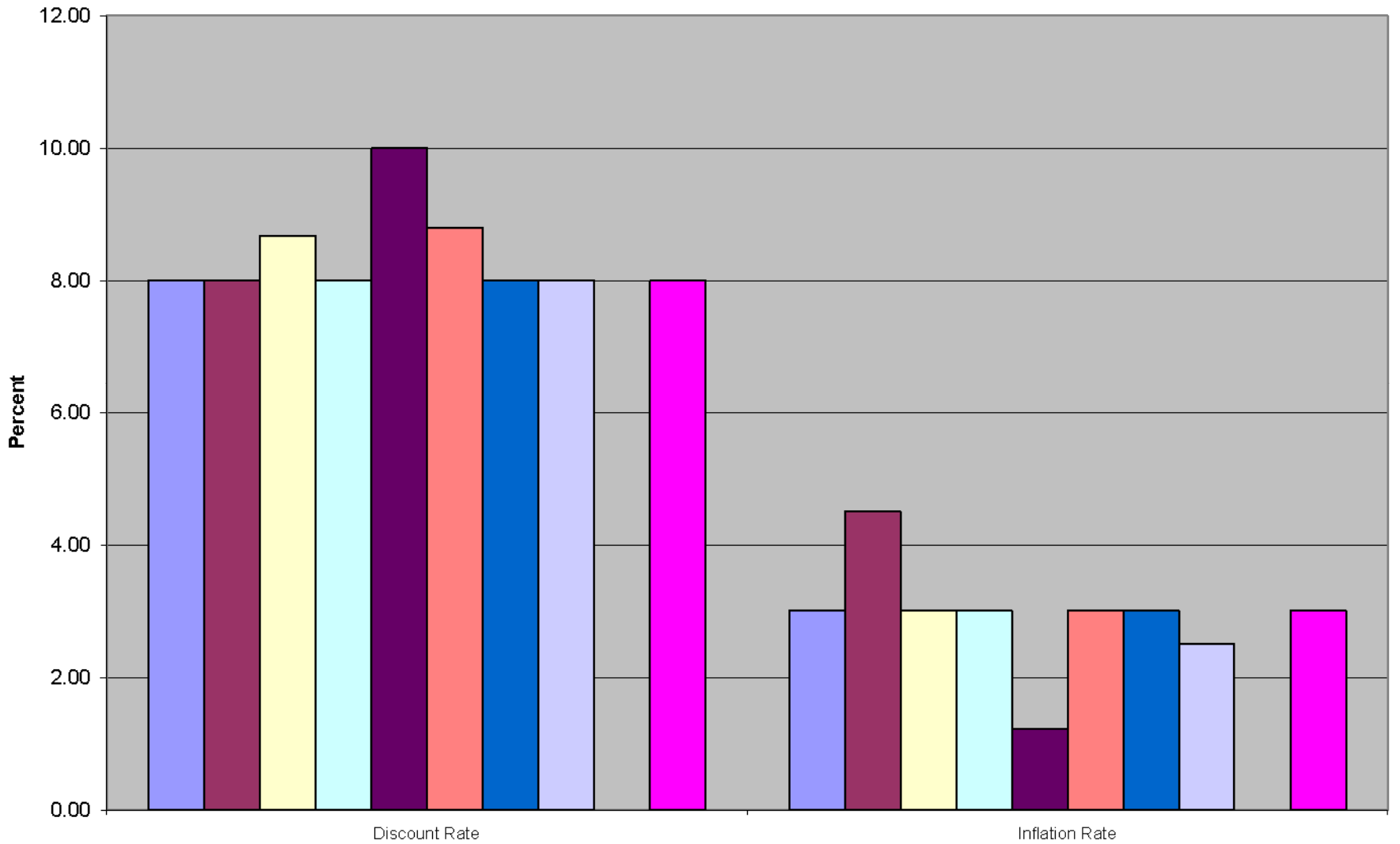


Fuel Prices

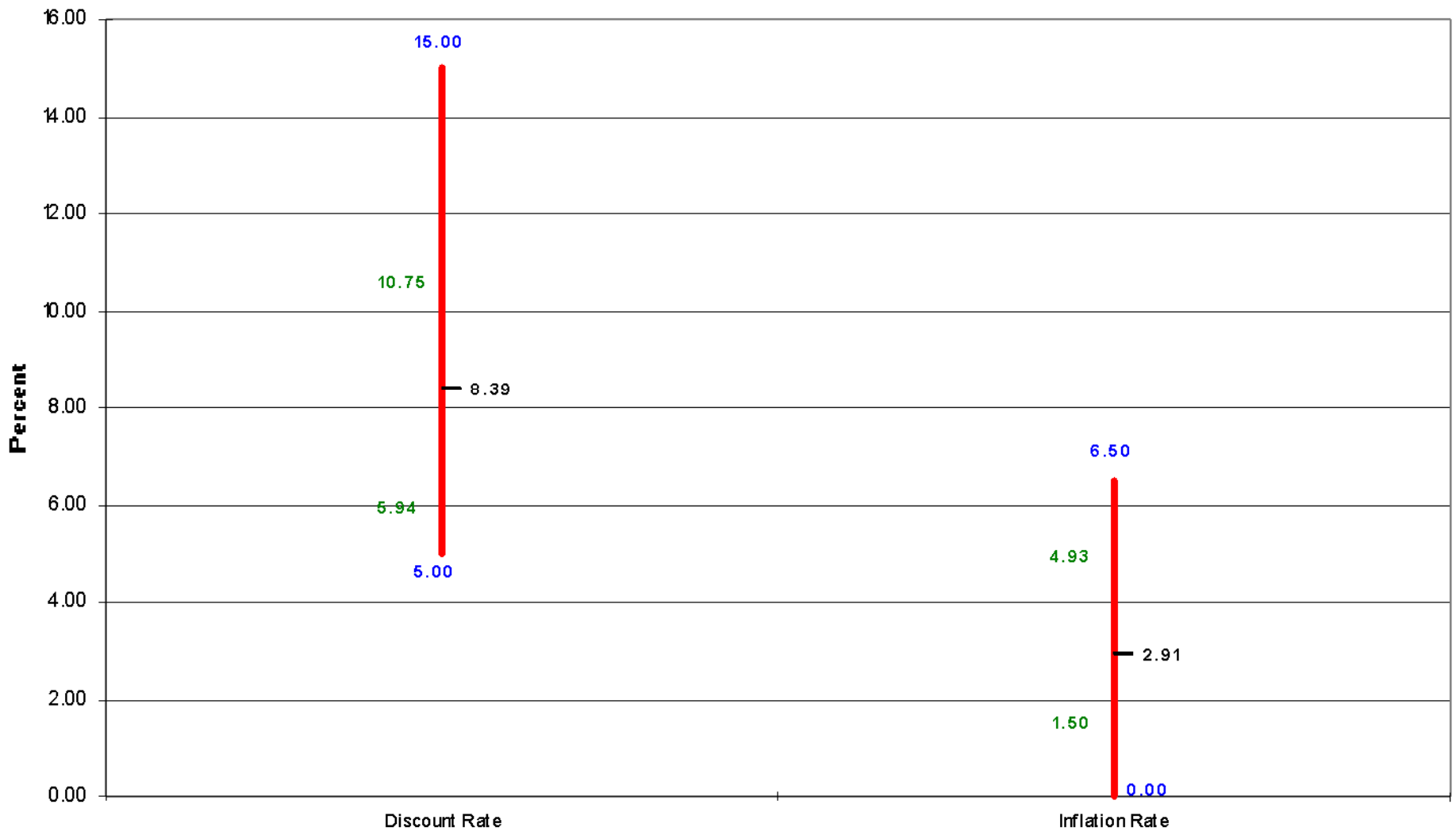


High Low - Mean High Mean Low Mean

Economic Variables

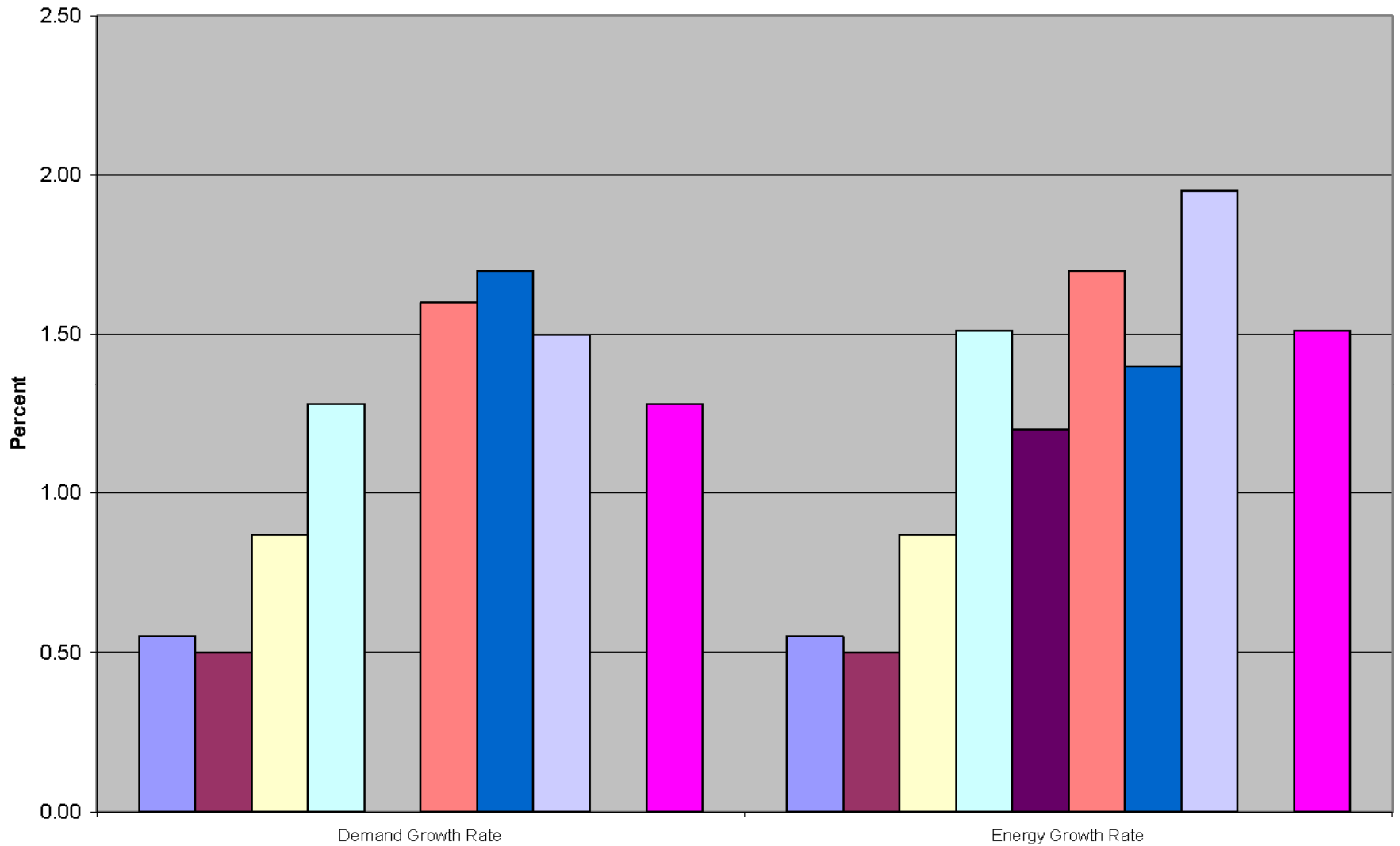


Economic Variables

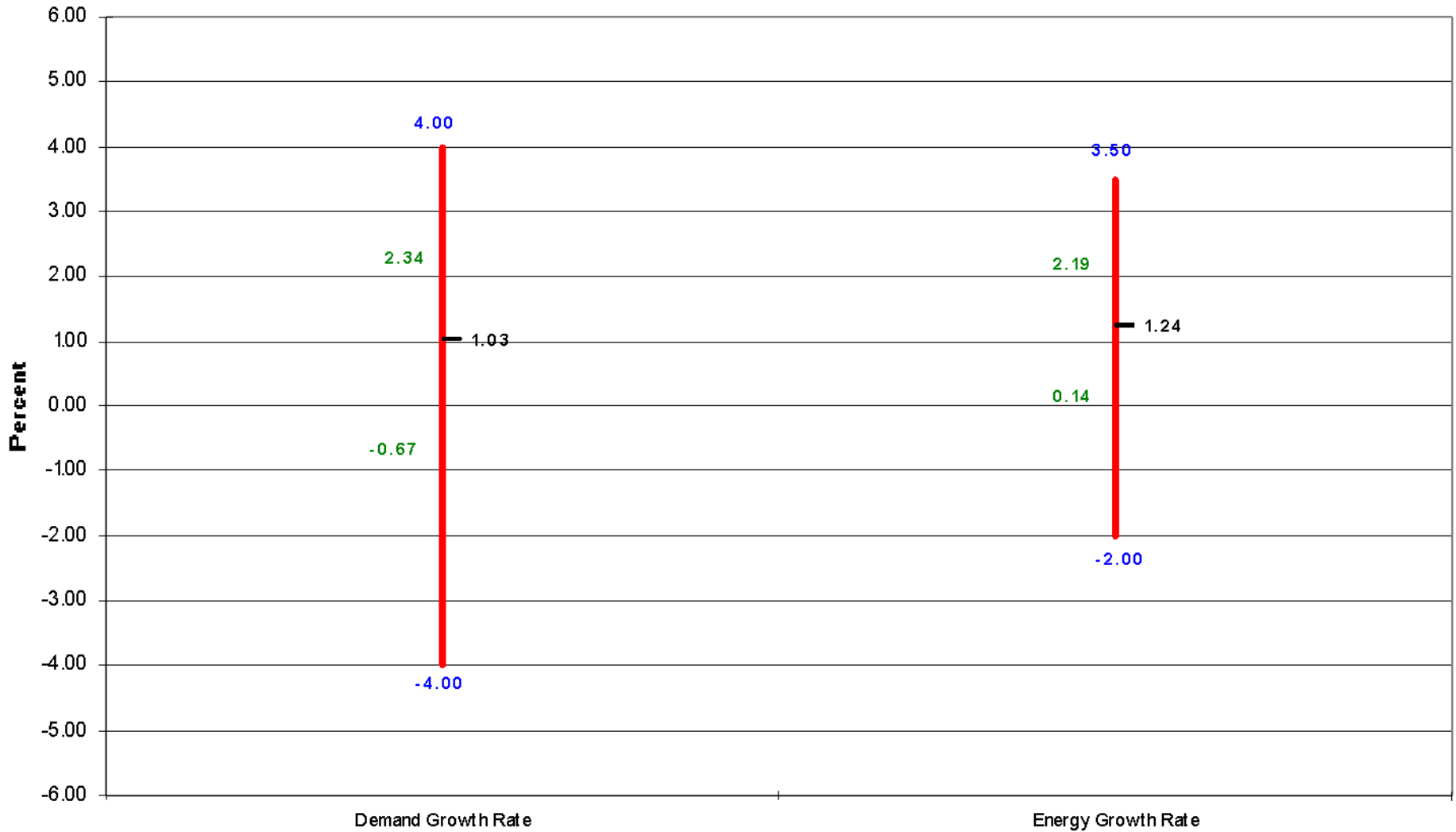


High Low - Mean High Mean Low Mean

Demand & Energy

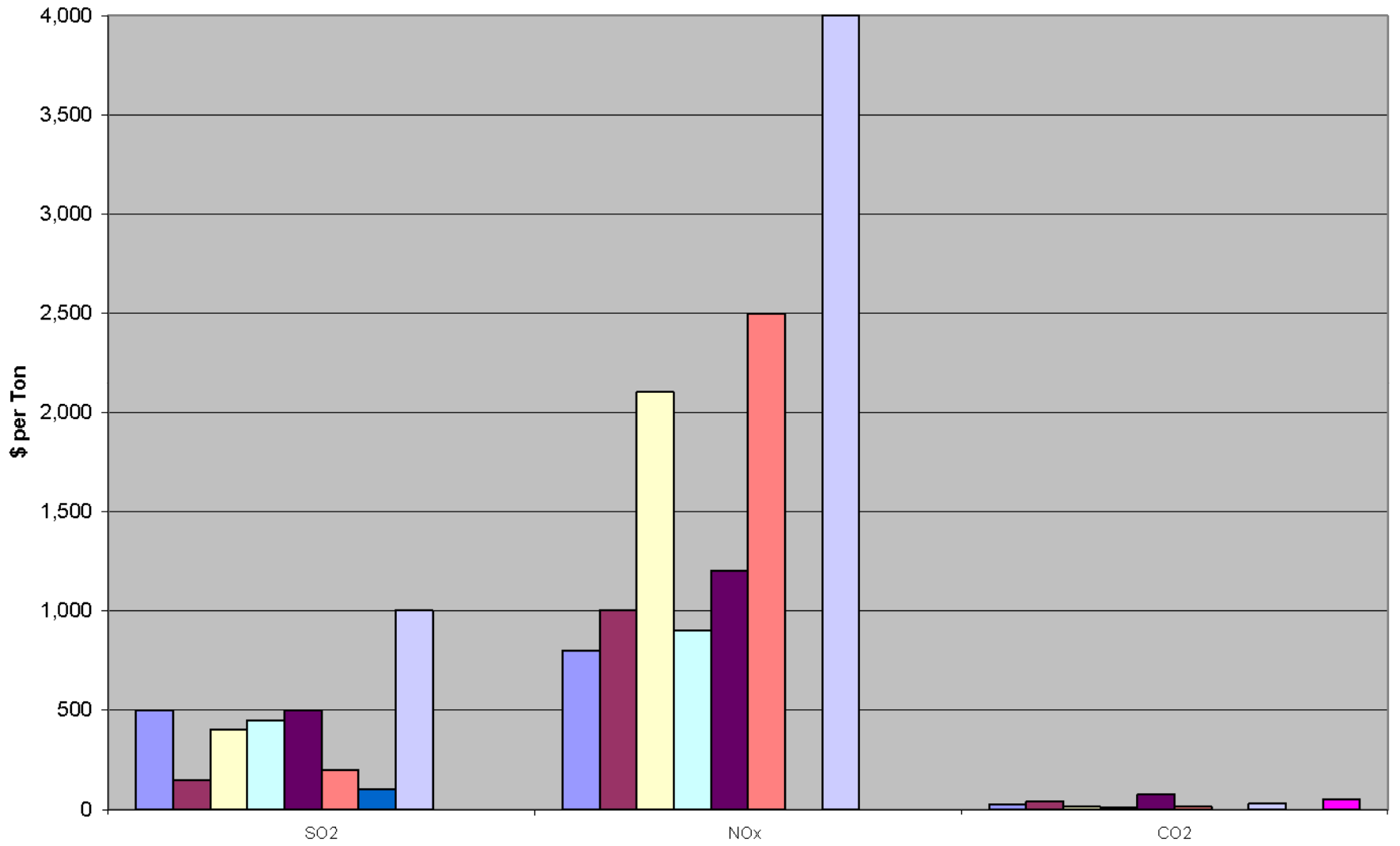


Demand & Energy



High Low - Mean High Mean Low Mean

Emissions



Emissions

