

Natural Gas, Electricity and CHP

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CHP and Energy Prices

- Typical CHP application reduces electricity purchases, increases gas purchases.
- CHP trades increased capital cost and gas purchases for lower electric purchases.
- Electricity savings must offset gas and capital costs.



The Concern

- Higher gas prices will swamp electricity savings.
- A reasonable concern where gas and electricity prices are decoupled.
- *But* - electricity markets are changing and increasingly linking to gas markets...



The Price of Electricity

- Average cost/regulated prices
- VS
- Marginal cost/competitive prices



Historic Electricity Prices

- Regulated electric rates, based on average cost of utility generation.
- Majority of electricity generated by low-cost nuclear, coal, hydro assets.
 - Energy cost \$25-\$35/MWh (2.5 - 3.5 cents/kWh).
- Large electric user rates relatively low - <\$0.05/kWh (\$50/MWh).
 - Retail rates higher than wholesale energy cost.

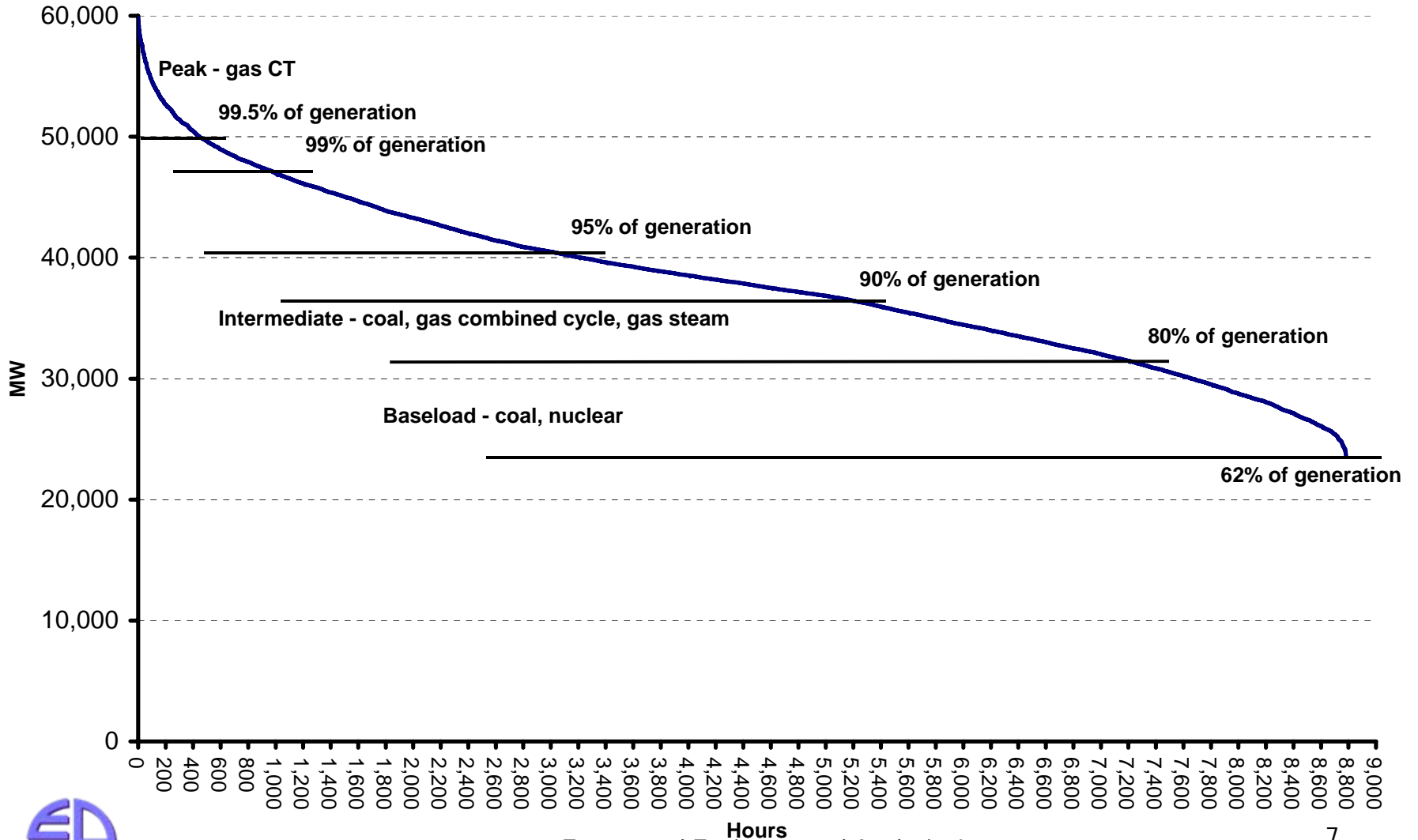


Restructured Electric Prices

- Wholesale price based on the marginal unit at each hour.
- Marginal units in many areas are gas-fired units for much of the year, even where coal is the primary energy source.
- In this case, gas and electricity prices are linked.



Electric Load Curve Disaggregation



When Are Electricity and Gas Linked

- Restructured electric markets
 - Marginal cost pricing
- Where gas-fired units are on the margin most of the time.
 - California/Northwest
 - Texas
 - Northeast
 - Mid-Atlantic
 - Parts of Midwest



Changing Electric Rates

- Price caps are coming off in restructured markets.
- Utilities moving to market-based rates for large customers.
- Electricity prices will track gas prices.
- Electricity prices are more than the energy component.



Comm Ed Example

- Large customers being transitioned from Rate 6L to Rate HEP.
- Electricity charged at PJM day-ahead rates plus capacity charges.
- PJM hourly rates can be low at off-peak times but very high at peak, especially during high demand periods
 - Prices easily over \$0.10/kWh during summer.



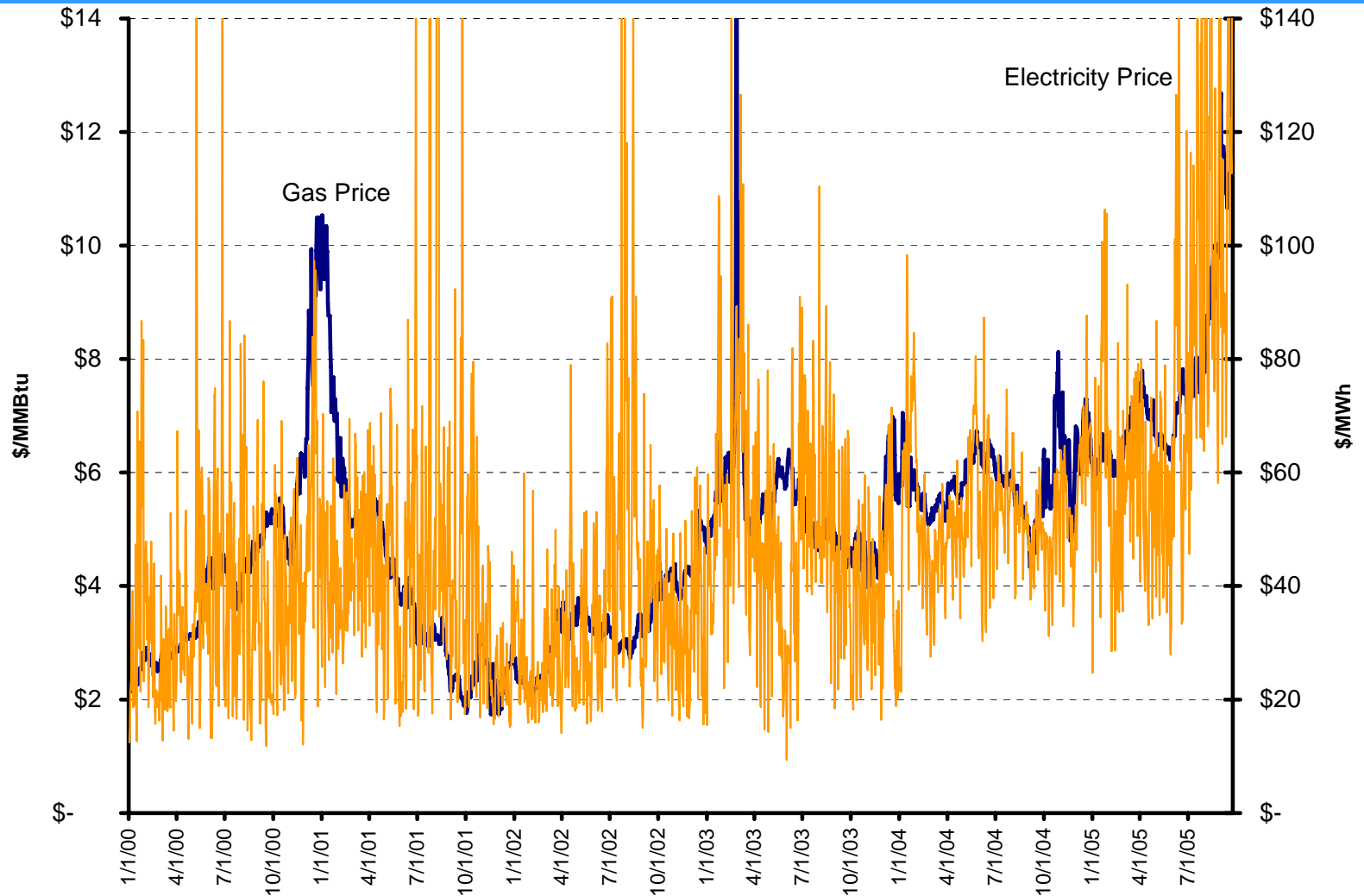
Henry Hub Gas Price

1/1/00 - 9/30/05



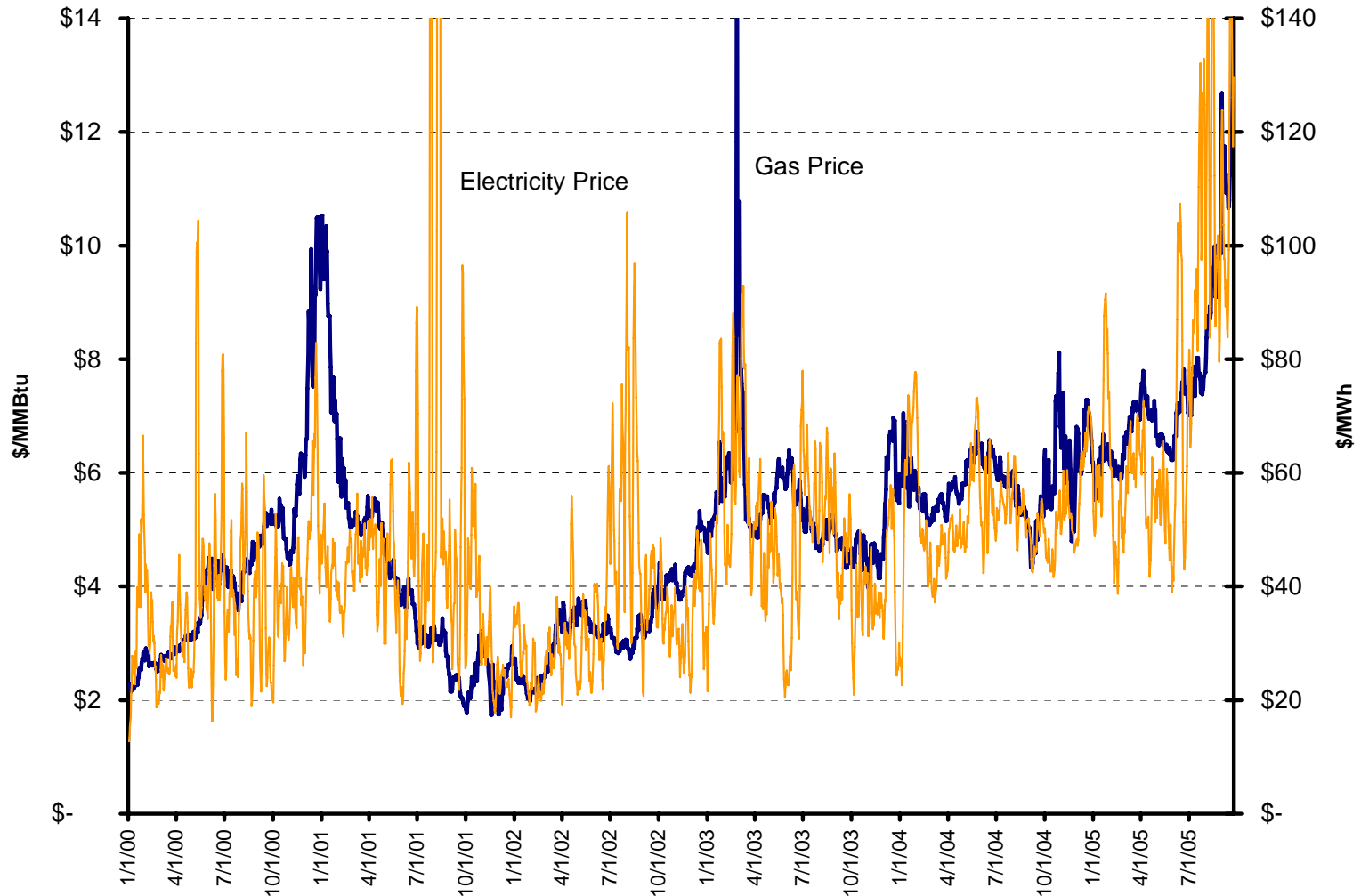
HH Gas Price vs PJM Electricity Price

1/1/00 - 9/30/05



HH Gas Price vs PJM Electricity Price

1/1/00 - 9/30/05



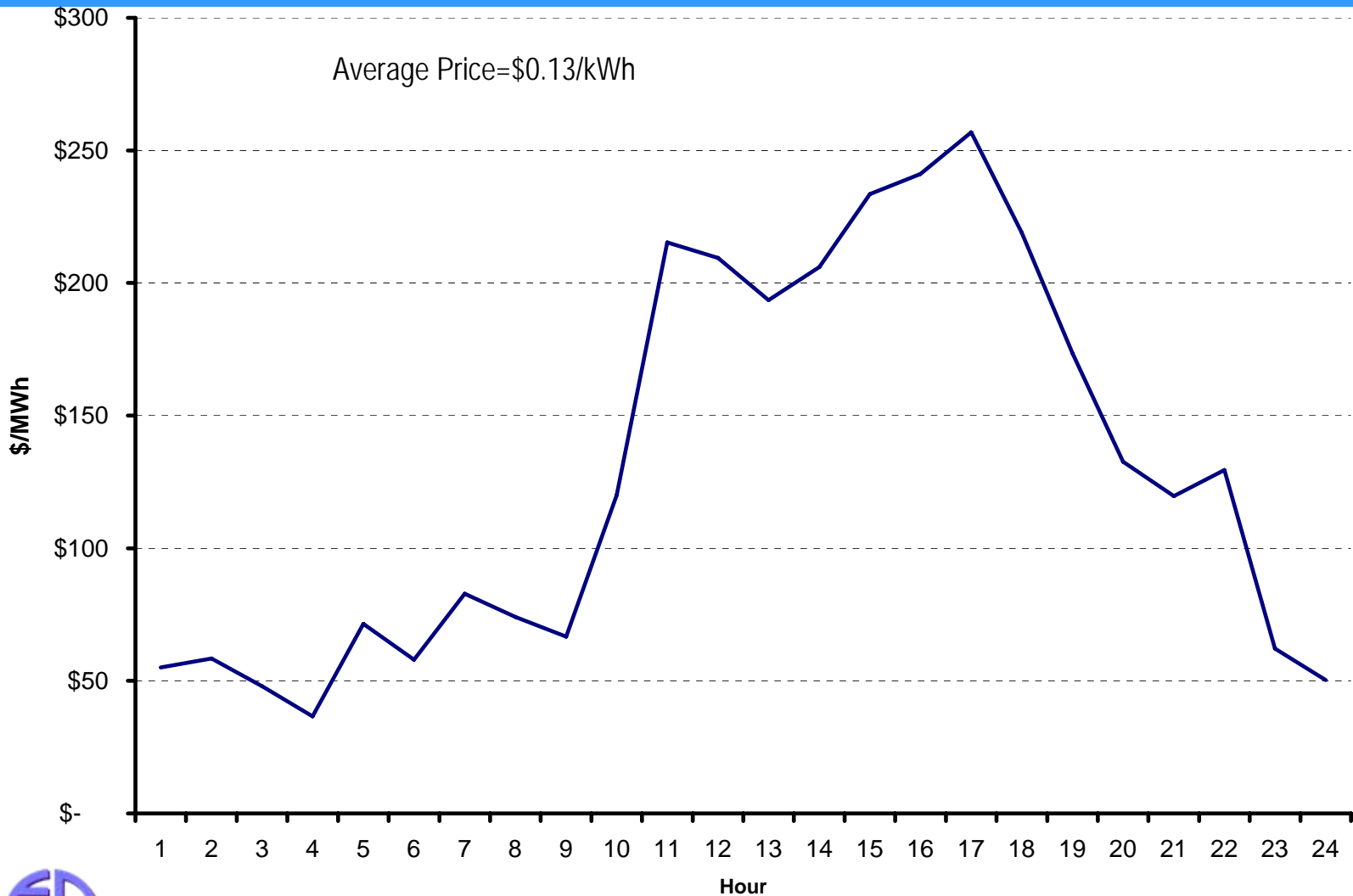
PJM PEPCO Electricity Price

1/05/05



PJM PEPCO Electricity Price

7/19/05



PJM PEPCO Electricity Price

3/30/06



Conclusions

- Gas prices are higher and will stay higher.
- Electricity prices will track gas prices in restructured markets with gas on the margin.
- Consumers will experience marginal electricity cost and volatility.
- Need to consider forward-looking, full cost of electricity in project evaluation.
- Effect is much smaller in regulated markets.

