



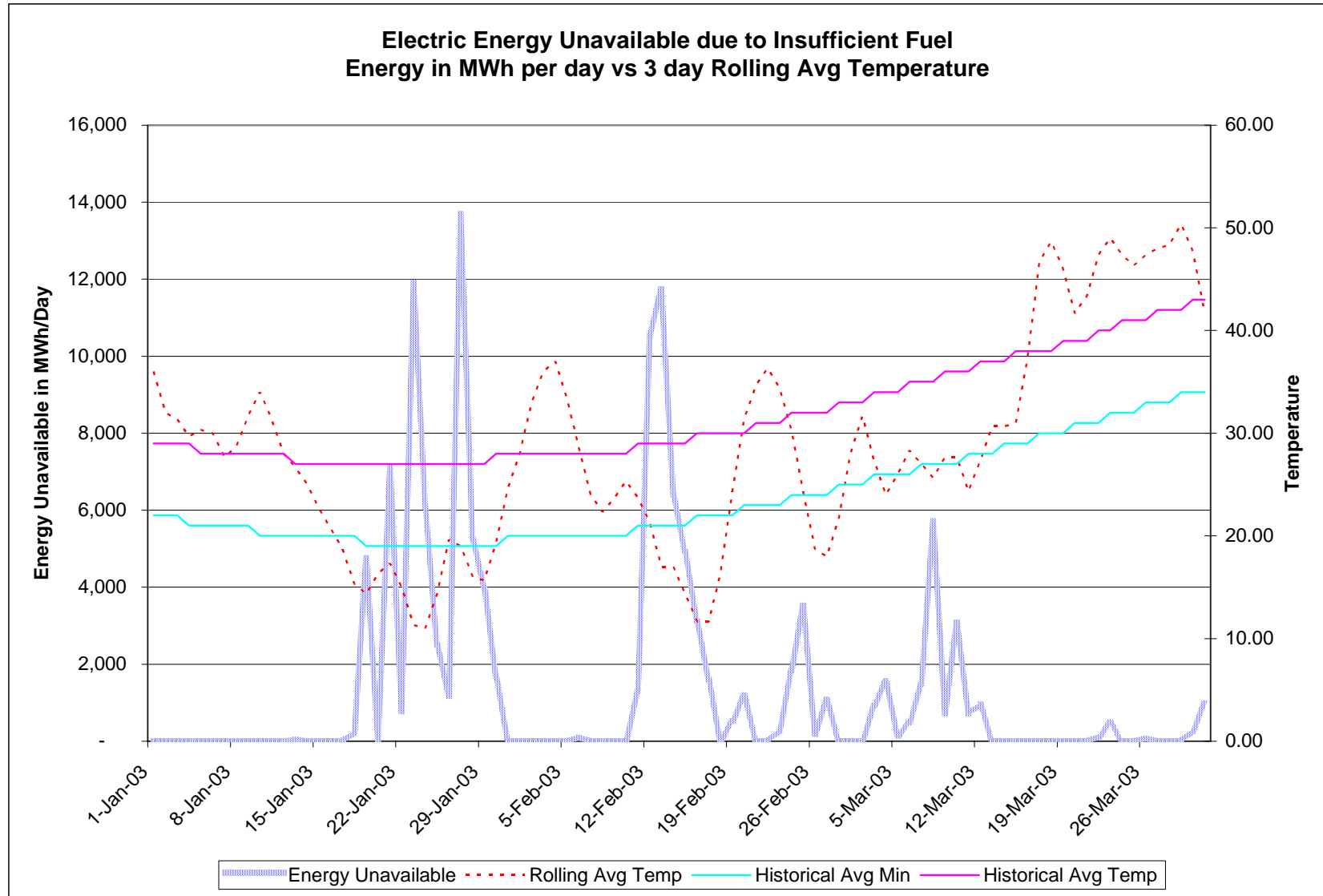
Effects of Gas Derates on the NYISO Electrical Grid Winter 2002-'03

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Introduction

- ✓ The intent of this analysis is to identify whether the natural gas deratings last winter had impacted the normal operation of the electrical grid.
- ✓ The analysis does not look into the specific cause of the deratings.
- ✓ Generators are free to make an economic decision to sell their fuel in the natural gas spot market and forgo energy revenues as long as they offer their generation into the electricity market in accordance with their NYISO Tariff obligations.

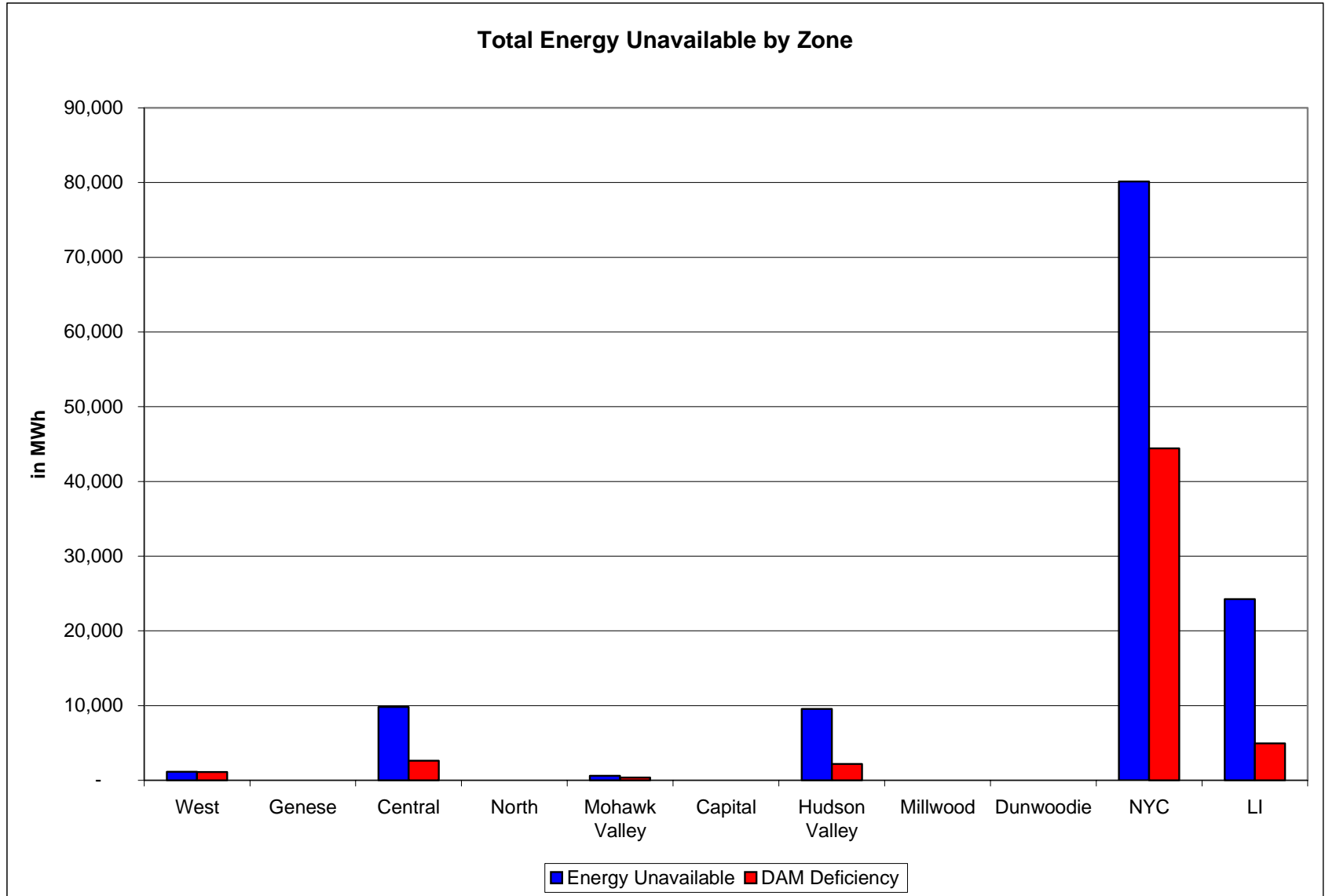
Overview of Results



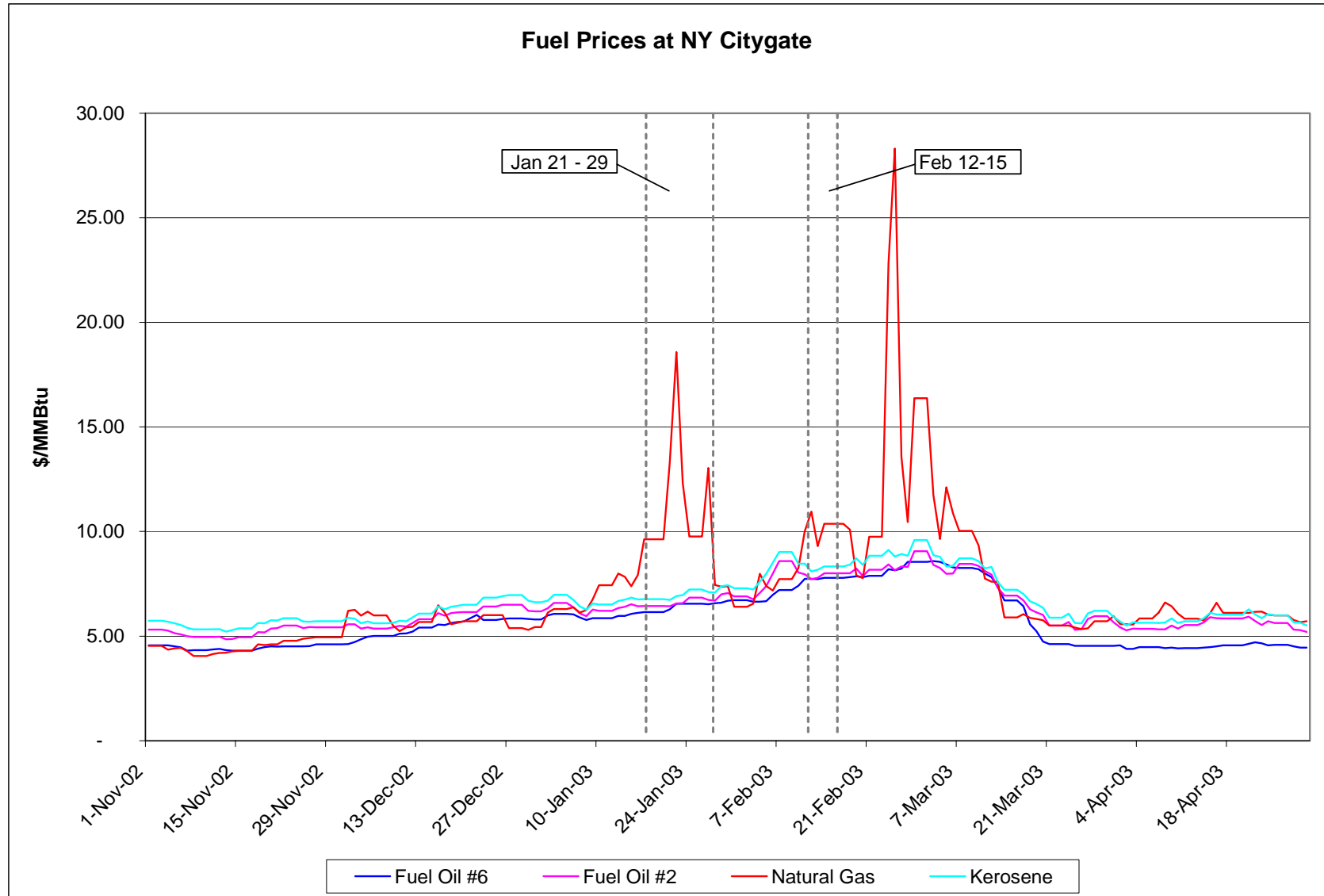
Overview of Results

- ✓ The total derated unit hours is estimated to be 1,636 hours. These hours include:
 - Derates for fuel oil in addition to natural gas; and
 - partial derates in addition to derates to zero.
- ✓ The largest hourly period of derates occurred on January 23, HB 19 – 20, with 918 MWs of capacity unavailable. This coincided with the winter peak load for 2003 of 24,454 MWs the hour prior.
- ✓ This is equivalent to the loss of a large single generator, and is less than the largest single system contingency of 1200 MWs.

Overview of Results



Fuel Markets



Generators

- ✓ A total of 44 different generating units were derated during the first 3 months of 2003 due to lack of fuel.
- ✓ Nearly 75% of the derates were caused, by no more than 10 units. The top three units derated due to lack of fuel are fully reliant on natural gas (e.g. no secondary fuel).
- ✓ Of the 44 derated units, 13 units were GTs without Day or Hour Ahead schedules representing only 12% of the total capacity derated. With one exception, the derating of these units had minimal impact on the electrical grid.
- ✓ Of particular concern is the large number of dual fueled units, 34 out of the 44 units, which were derated despite being capable of operating on alternative fuels.

Potential Causes for Fuel Disruptions

- ✓ There are numerous reasons for generators not having sufficient fuel. (Note that fuel oils may face similar availability and delivery problems.)
 - Unavailability of economic natural gas, either from producing regions or storage;
 - Unavailability of pipeline capacity, either from producing regions or storage facilities, including restrictions or Operational Flow Orders on interstate pipelines;
 - Unavailability or restrictions on natural gas transportation by LDC's within the citygate, including OFOs; and
 - Economic decisions made by generators to sell their natural gas opportunistically.

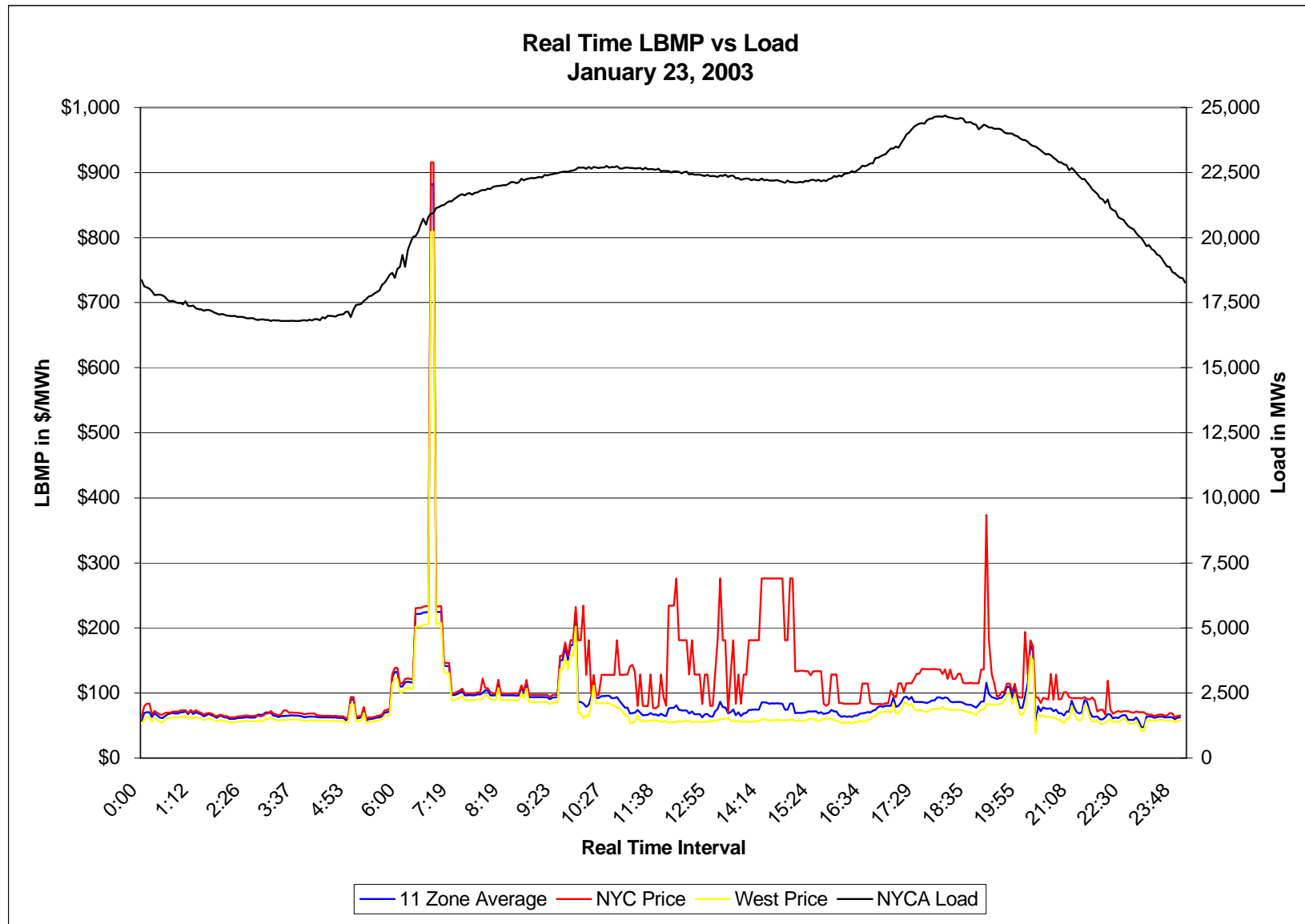
Impacts on Electrical Grid

- ✓ January 23 was one of the colder periods of the winter season with the 2nd lowest average temperature of 9° F of the winter.
- ✓ The winter peak electrical load occurred at HB 18 on this date with 24,454 MWs.
- ✓ Lastly, the largest hourly derates occurred with a total capacity of 918 MWs derated due to lack of fuel.

Impacts on Electrical Grid

- ✓ An in-city generator was derated around 0600 for lack of natural gas. This coincided with the morning electrical load pickup with load increasing by 2700 MWs from 0600 to 0655.
- ✓ From 0630 to 0733, the average real time LBMP started to increase precipitously. Prices exceeded \$200/MWh for 33 minutes and the highest price spike of \$915.93/MWh (NYC) endured for an interval of 5 minutes before returning to \$100/MWh.
- ✓ While the derating of the generator, in of itself, did not necessarily contribute to the Alert State and the subsequent price spike, the unit(s) were no longer available resources to the NYISO operators to assist in alleviating these conditions.

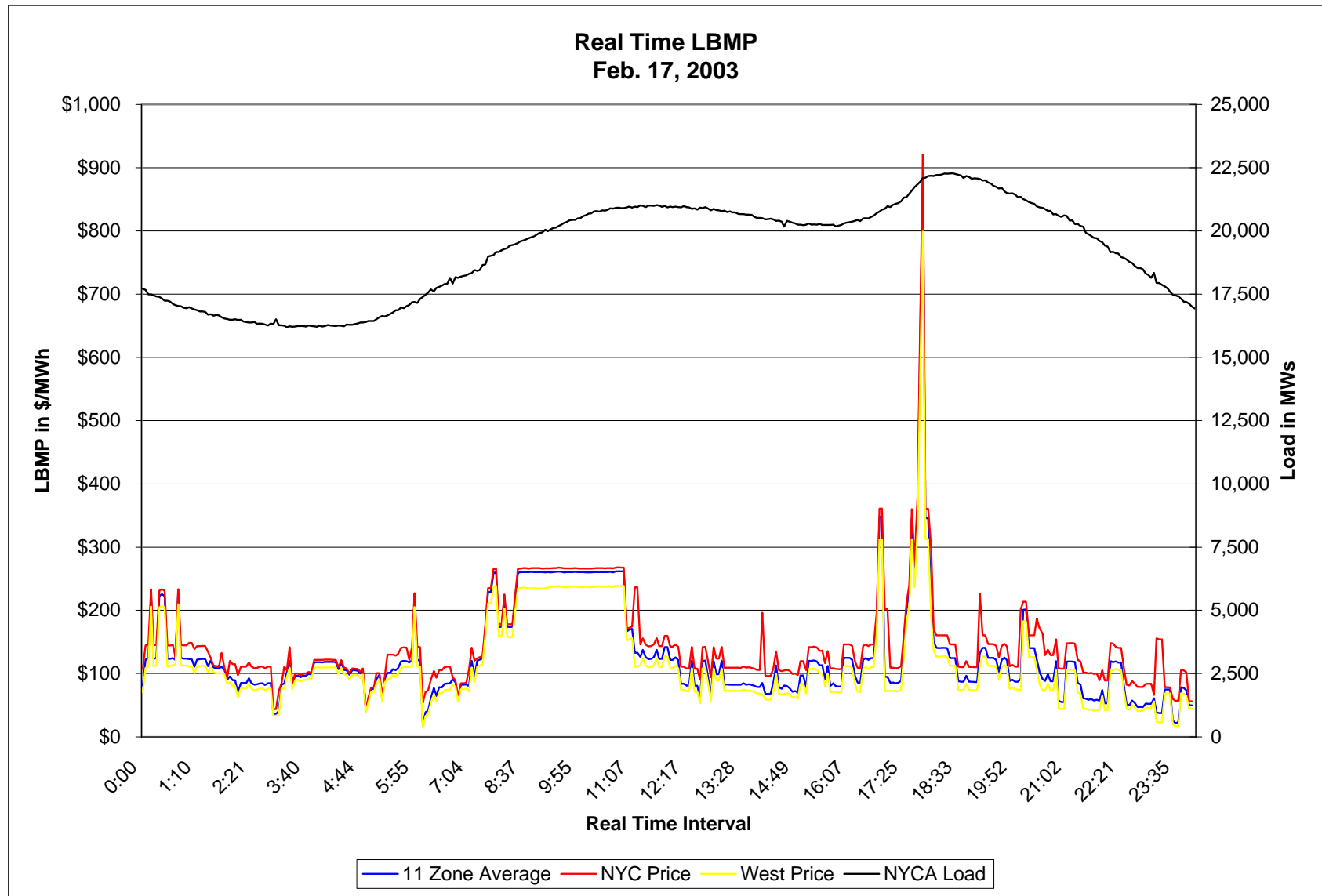
Impact on Electrical Grid



Impacts on Electrical Grid

- ✓ The most visible impact on the electrical grid due to gas derates was on Feb. 17 (President's Day Holiday).
- ✓ While the temperatures on Feb 17 were modest compared to previous periods, the coldest day over the winter occurred the day before with an average temperature of 7° F. This affected normal operations for both generators and the operation of the transmission grid.
- ✓ As a precaution due to anticipated icing and weather related issues, an SRE was issued requesting HAM bids from HB 1600 – 2000.
- ✓ After having submitted HAM bids for the peak hours, an in-city GT was derated due to lack of gas.

Impact on Electrical Grid



Impacts on Electrical Grid

- ✓ Starting at 17:25, following the gas derates, real time LBMP prices started to rise precipitously. Prices exceeded \$200/MWh for 30 minutes and the highest price spike of \$921.14/MWh (NYC) lasted 2 minutes before returning to \$144/MWh.
- ✓ Prior to the derate, the in-city LDC offered natural gas from their LNG facilities. The LNG facilities in NYC are natural gas peak-shaving facilities used by both LDCs as the last line of defense to maintain pressure and the integrity of the gas system.
- ✓ Furthermore, the cause of the derates on Feb. 17 was an operational issue of the interstate pipelines (out of the several ultimately serving the NY citygate) outside of NYCA.

Observations and Next Steps

- ✓ Overall, the electric and gas markets worked well. Both produced clear market signals during periods of scarcity and the markets adjusted accordingly.
- ✓ While derates due to lack of fuel resulted in short term system alerts last year, the ever increasing reliance on natural gas could expose the electrical system to greater reliability issues in the future.
- ✓ The simple reliability solution might be to increase or strengthen the natural gas infrastructure which generation so readily relies upon.
- ✓ However, who pays for this costly approach is not easily resolved.

Observations and Next Steps cont.

- ✓ NYISO has been and continues to be an active participant in evaluating the potential impact of the natural gas infrastructure on the reliability of the electric system.
 - *Coordination with gas market participants: The NYISO has met with PSC, Gas LDCs, and in-city generators to discuss opportunities for increased coordination and evaluation of “seams” issues between electrical and gas markets.*
 - *Studies: NYISO participation with PSC & NYSERDA in gas reliability studies as well as development of NYISO in-house natural gas expertise.*
 - *Reference Prices: Quick Reference Price updates for natural gas prices during volatile periods.*
 - *NYISO has formed a team to better understand environmental impacts associated with fuel usage.*
 - *NYISO has undertaken planning activities recognizing potential capacity loss due to fuel availability/environmental concerns.*