

# NYISO Wind Integration Study Status Report

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*For Discussion Purposes Only*

# NYISO Study Tasks

- 1. Develop study assumptions**
  - 1. Select study years,***
  - 2. Develop wind generator penetration forecast,***
  - 3. MW output profile, and***
  - 4. MW load profile.***
- 2. Develop and implement performance monitoring for operating wind generators.**
- 3. Review other regions' experience with wind generators.**

# NYISO Study Tasks (cont.)

- 4. Study the impacts on system operations of wind generators at various future levels of installed MW for the selected study years.**
- 5. Evaluate the impact of the higher penetration of wind generation on system planning and the need for transmission infrastructure from a thermal, voltage and stability perspective.**
- 6. Evaluate the impact of the higher penetration of wind generation on energy production by fuel types, LBMP/Congestion, reserve, regulation, load following costs and including the impact of selected facility outages on system operations as well as transmission expansion for future years.**

# Summary of Task Status

Task	Current Task Status
1	Complete
2	Complete
3	Complete
4	Simulations complete with the variability reports under review analysis completed by second half of January
5	Peak load case being analyzed with minimum load case under development. Complete analysis by January
6	Cases under development complete analysis by January

# Wind Plant Integration Issues

- ◆ **Transmission**
- ◆ **System Flexibility**
- ◆ **Operator Awareness and Practices**
- ◆ **Wind Generation Plant Performance & Standards**

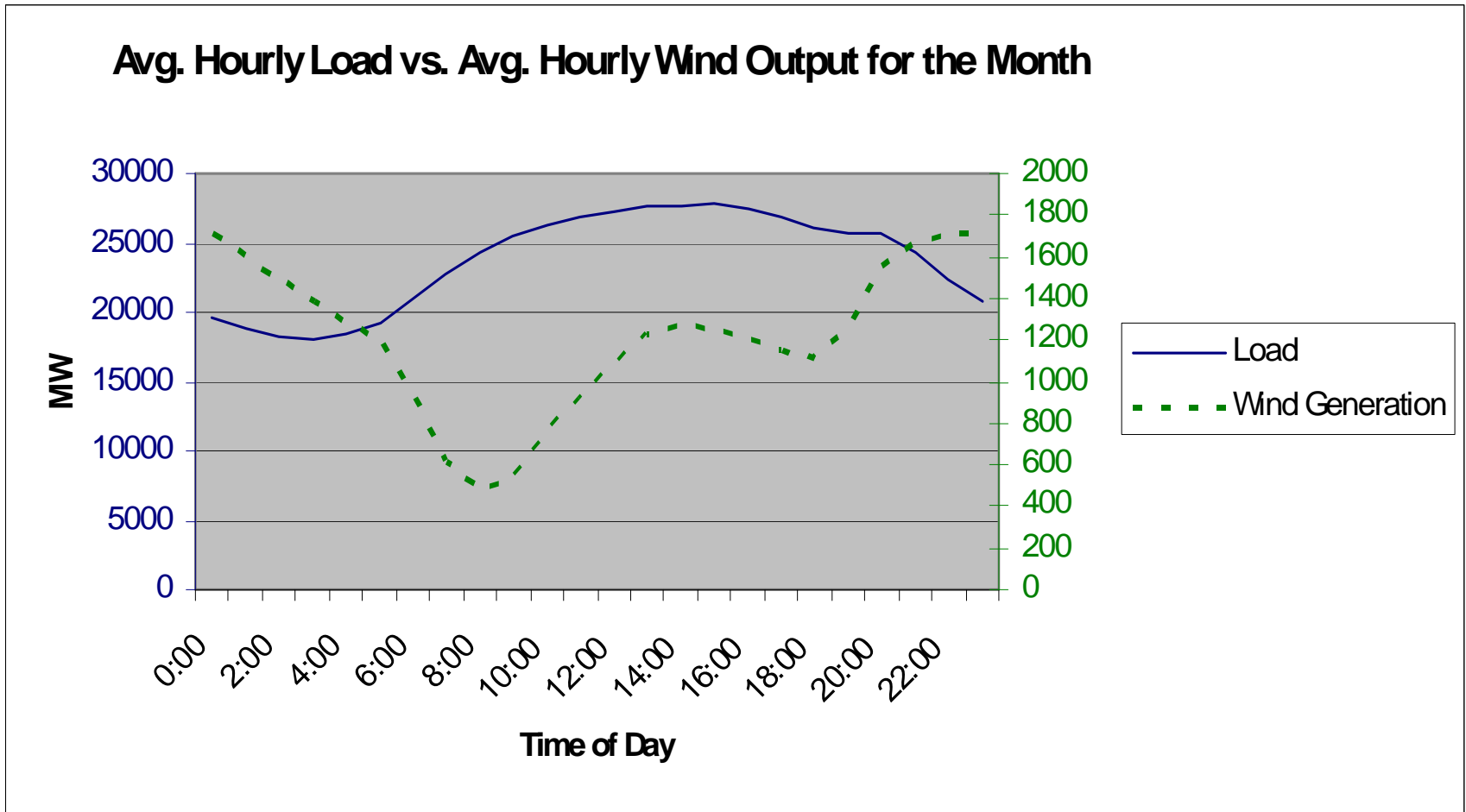
# Issues Resolved Since Last Report

- ◆ Eighty meter tower Vs 100 meter tower
  - *First 1,500 MW simulated with 80 meter towers while the balance above that for any given scenario was simulated with 100 meter tower*
  - *First study conducted with 80 meter towers*
- ◆ Much of the lower than expected capacity factors observed this past summer were attributed to lower wind conditions
- ◆ Production cost simulations are on an hourly basis but can model increased regulation requirements if needed.

# Wind Plant Performance - 2013

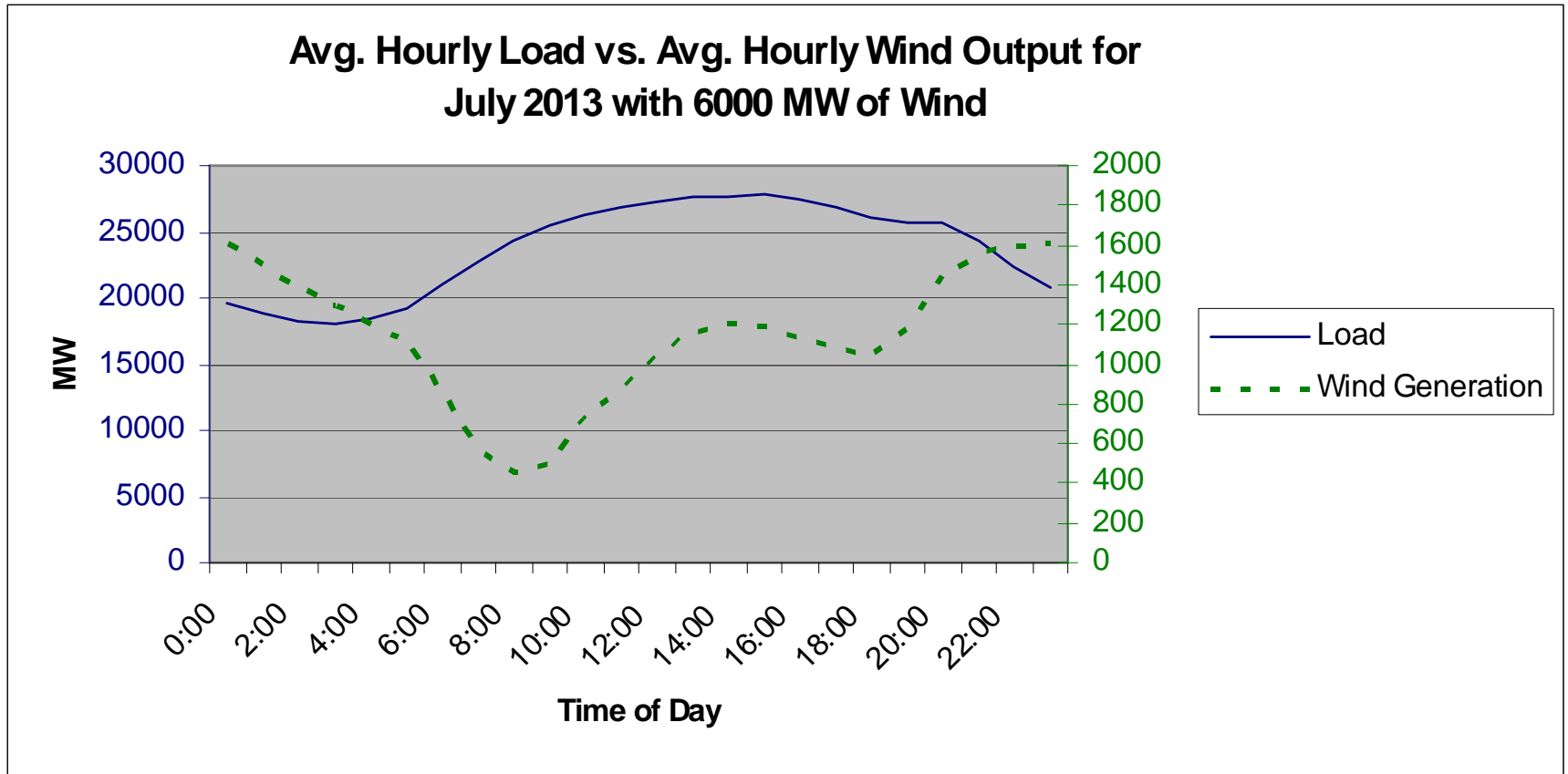
- ◆ An example of simulated wind plant output for 6000 MW of nameplate NY wind plants for the month of July as simulated from the AWS data. Red or bold reflects changes by including 80 meter towers.
  - *Simulated July capacity factor 20.2% (**18.9%**) based on 2005 wind data Vs. 2008 actual of 16.5%*
  - *Simulated July system peak hour coincidence factor based on 2006 wind data 51.5% (**49.5**) Vs 38.2% in July 2008.*
  - *Max one hr wind output simulated based on 2005 wind data was 4330.8 (**4163.1**) MW*
    - This represents 72% (**69.4%**) of nameplate compared with an actual 70% of nameplate in July 2008.

## Simulated Average Day – July 2013 (100 m tower 2005 wind data)

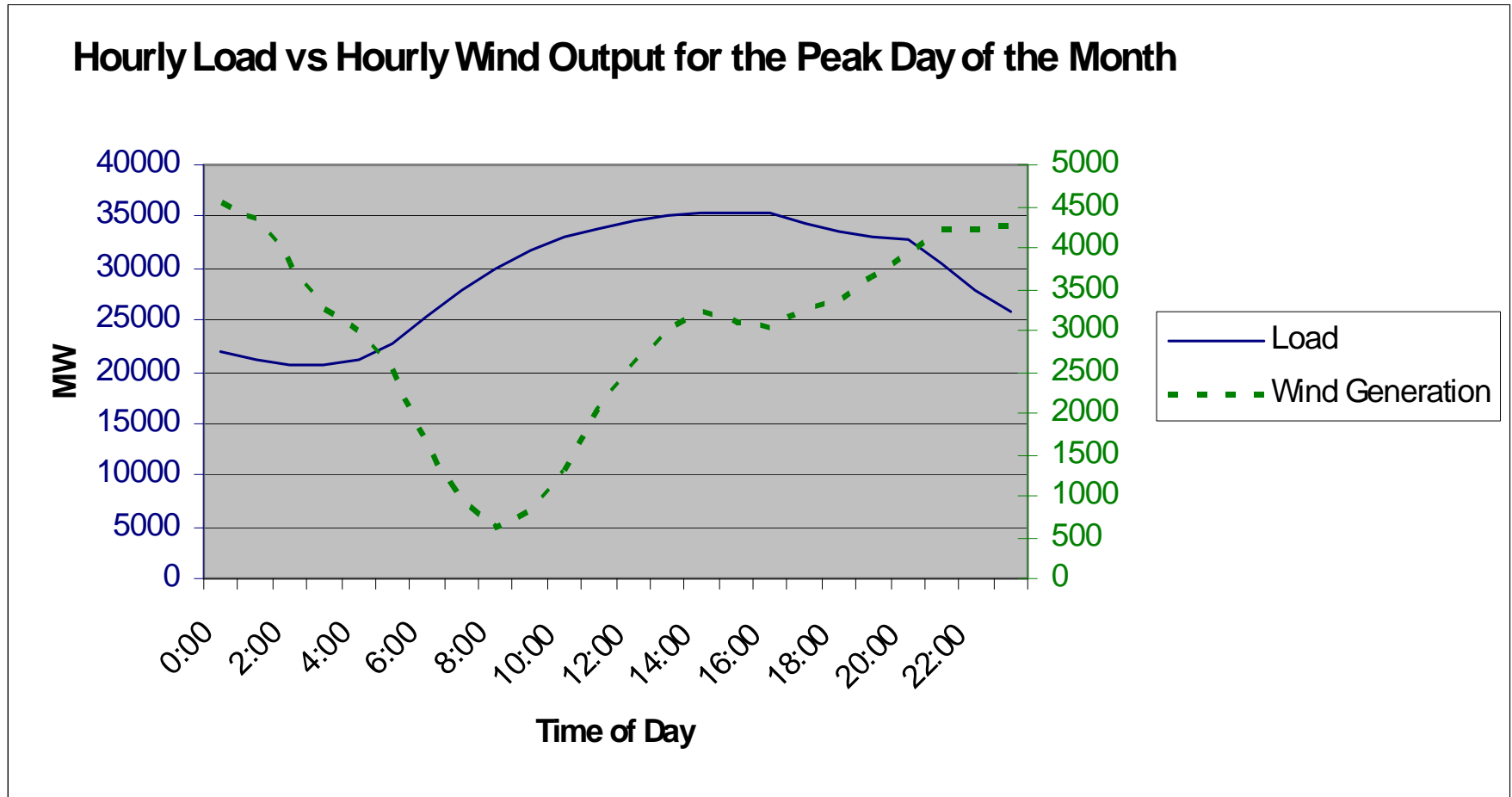




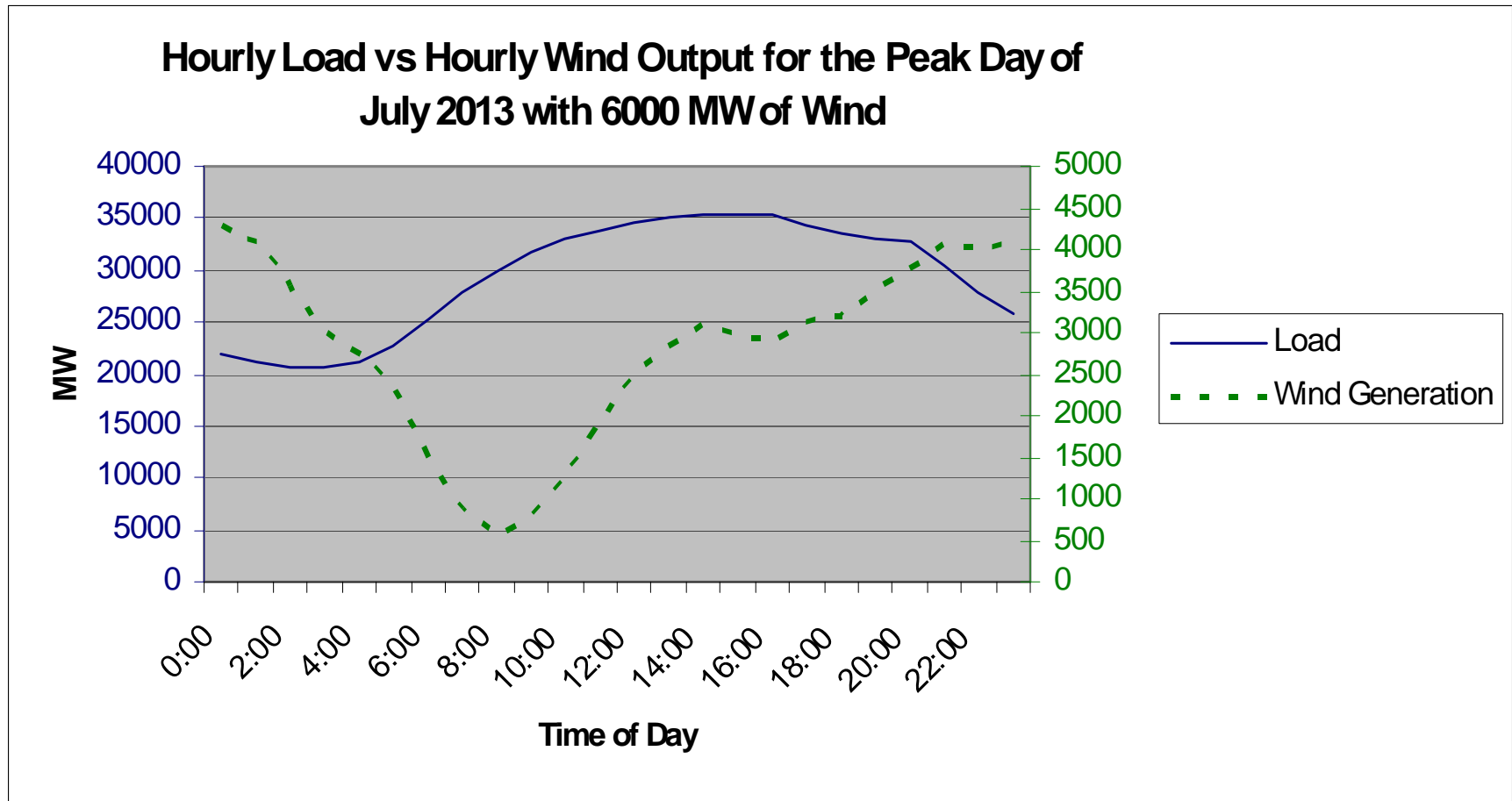
## Simulated Average Day – July 2013 (mixed tower data)



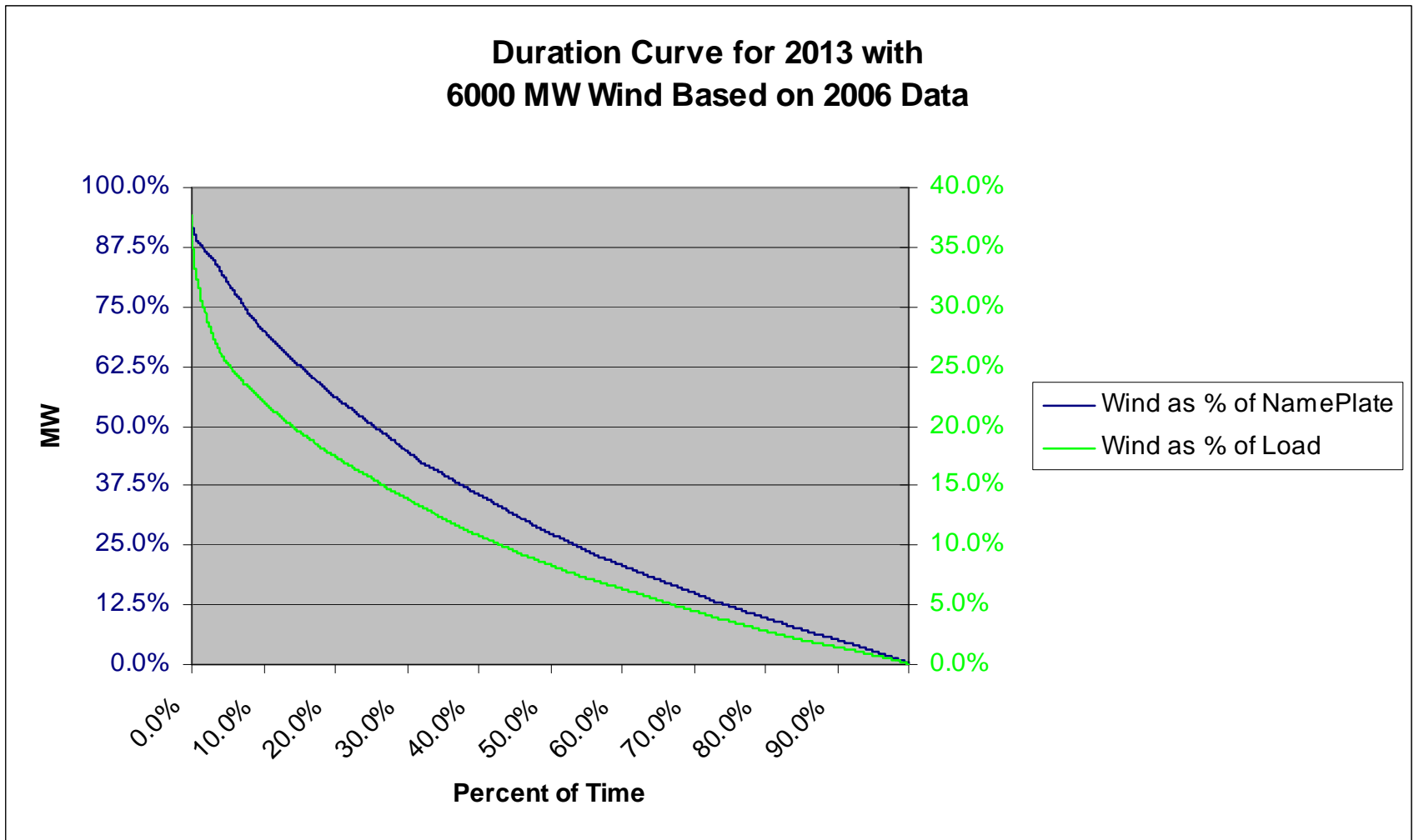
## Simulated Peak Day – July 2013 (100 m tower 2006 wind data)



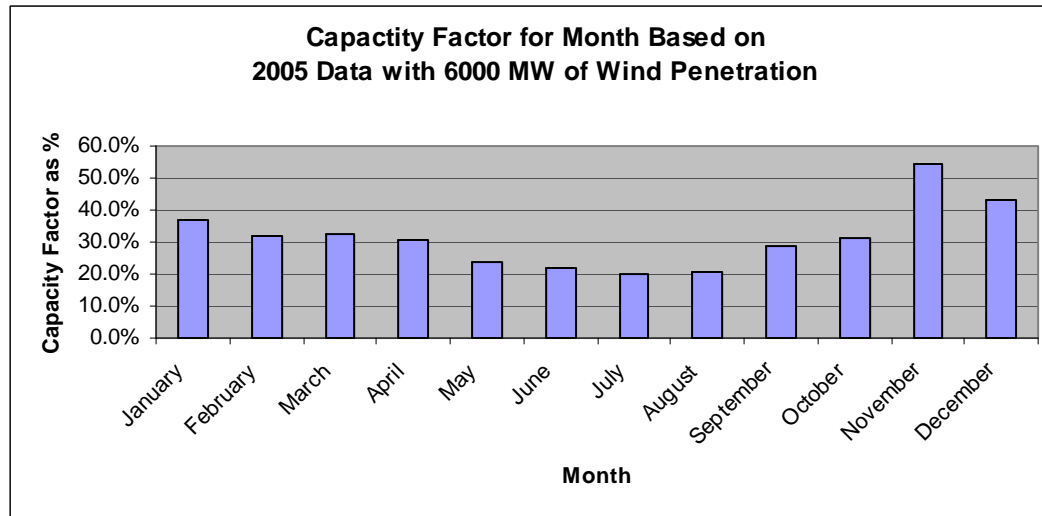
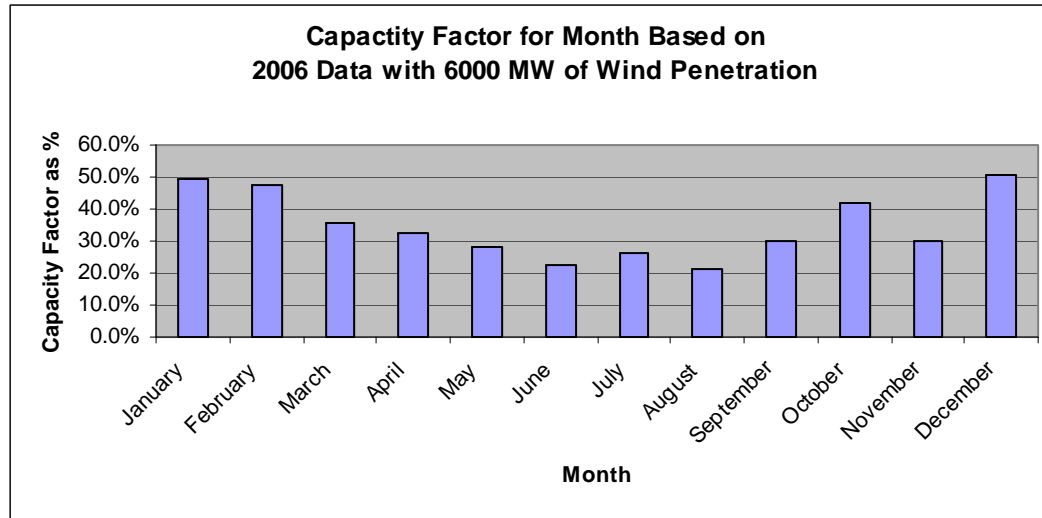
## Simulated Peak Day – July 2013 (including 80 m tower)



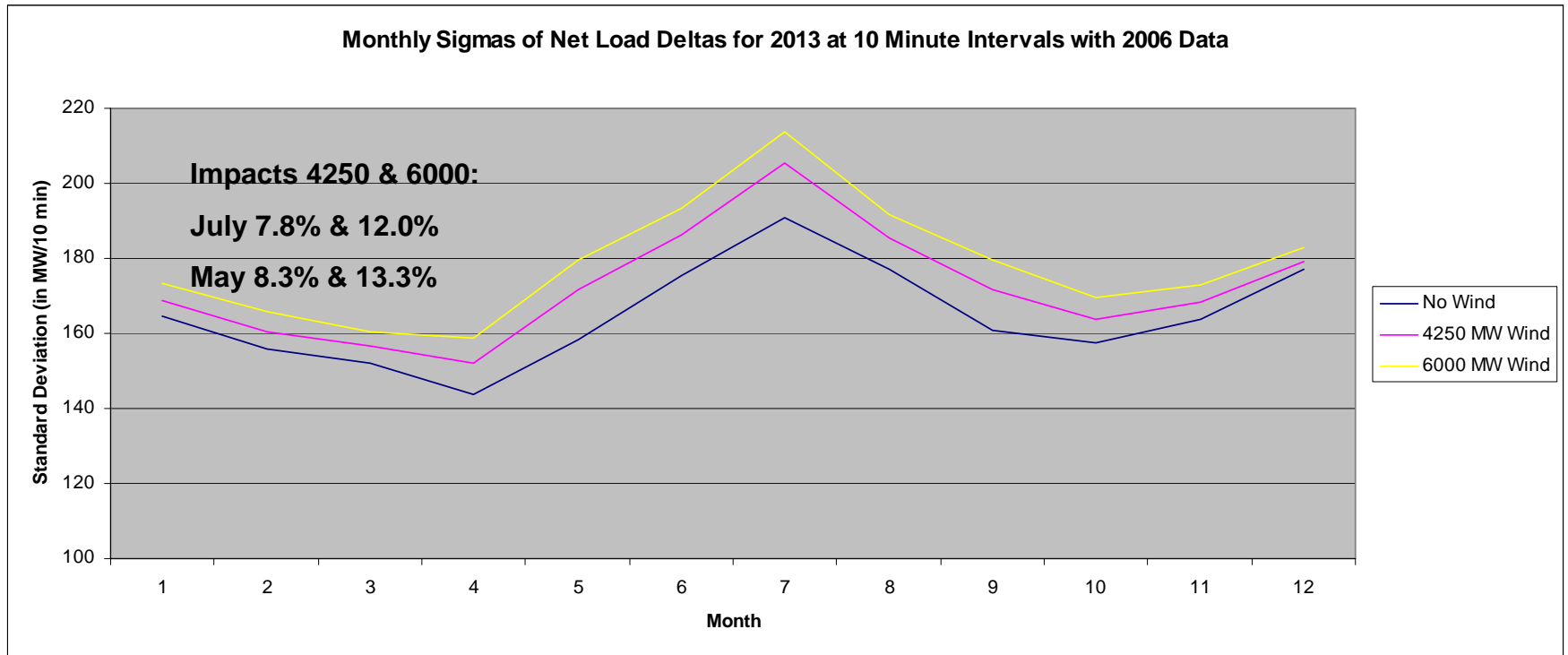
# Wind Plant Output Duration Curves as % of Nameplate and Hourly Load for 2013 based on 6000 MW and 2006 wind data



# Projected Wind Plant Monthly Capacity Factors for 2013 based on 6000 MW, 2006 and 2005 wind data



# Impact of Simulated Wind Plant Output on Ten Minute Net Load Sigmas'



# Other Wind Study Activities

- ◆ **Eastern Interconnection Wind Integration Study Activities**
  - *Through their **Joint Coordinated System Planning** process **MISO, PJM, SPP and TVA** are conducting a study of transmission needs for a reference and 20% wind penetration scenario.*
  - *The **Eastern Wind Integration and Transmission Study (EWITS)** being lead by **DOE/NREL (National Renewable Energy Lab)** is focusing on the costs and operating impacts of wind penetration scenarios up to 30%.*
- ◆ **North America Electric Reliability Council's Integration of Variable Generation Task Force.**
  - *Report to be finalized and distributed in the first quarter of 2009.*

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

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