



Post-Sandy Lessons for Grid Resiliency

Stephen G. Whitley

President & CEO

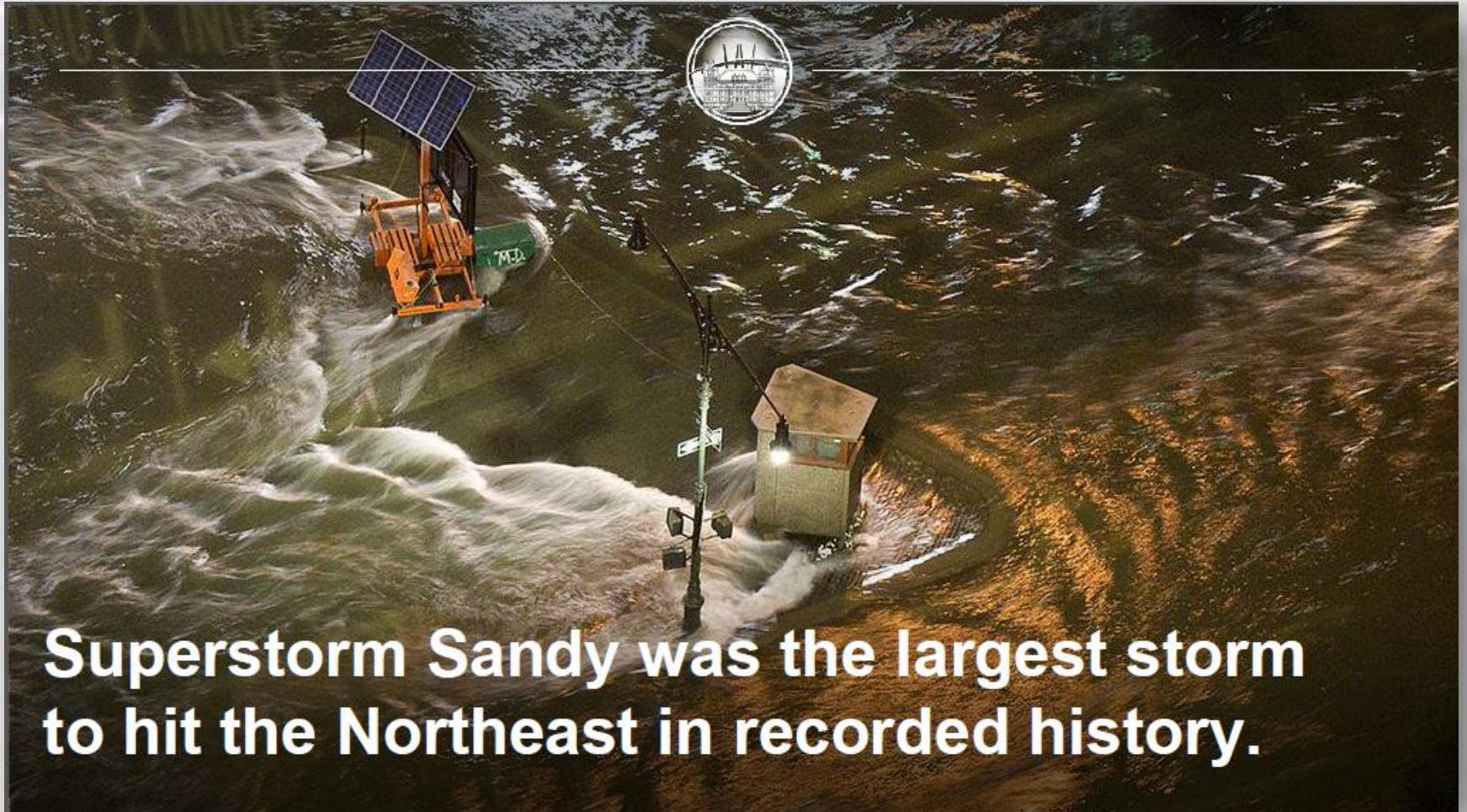
New York Independent System Operator

U.S. Department of Energy

Electricity Advisory Committee Meeting

March 13, 2014

Superstorm Sandy



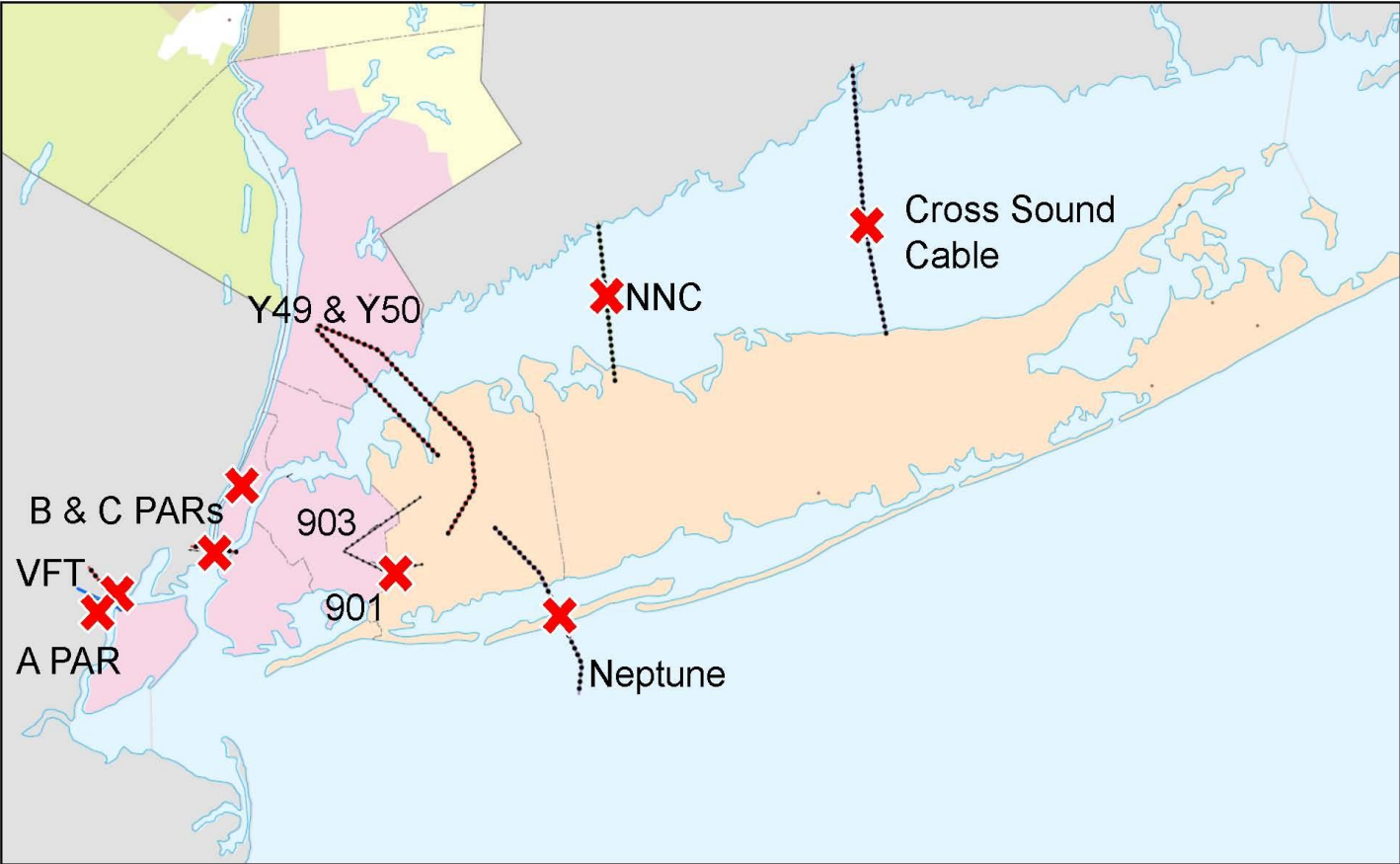
Superstorm Sandy was the largest storm to hit the Northeast in recorded history.

SOURCE: *2013 State of the State Address*, Governor Andrew M. Cuomo, January 9, 2013

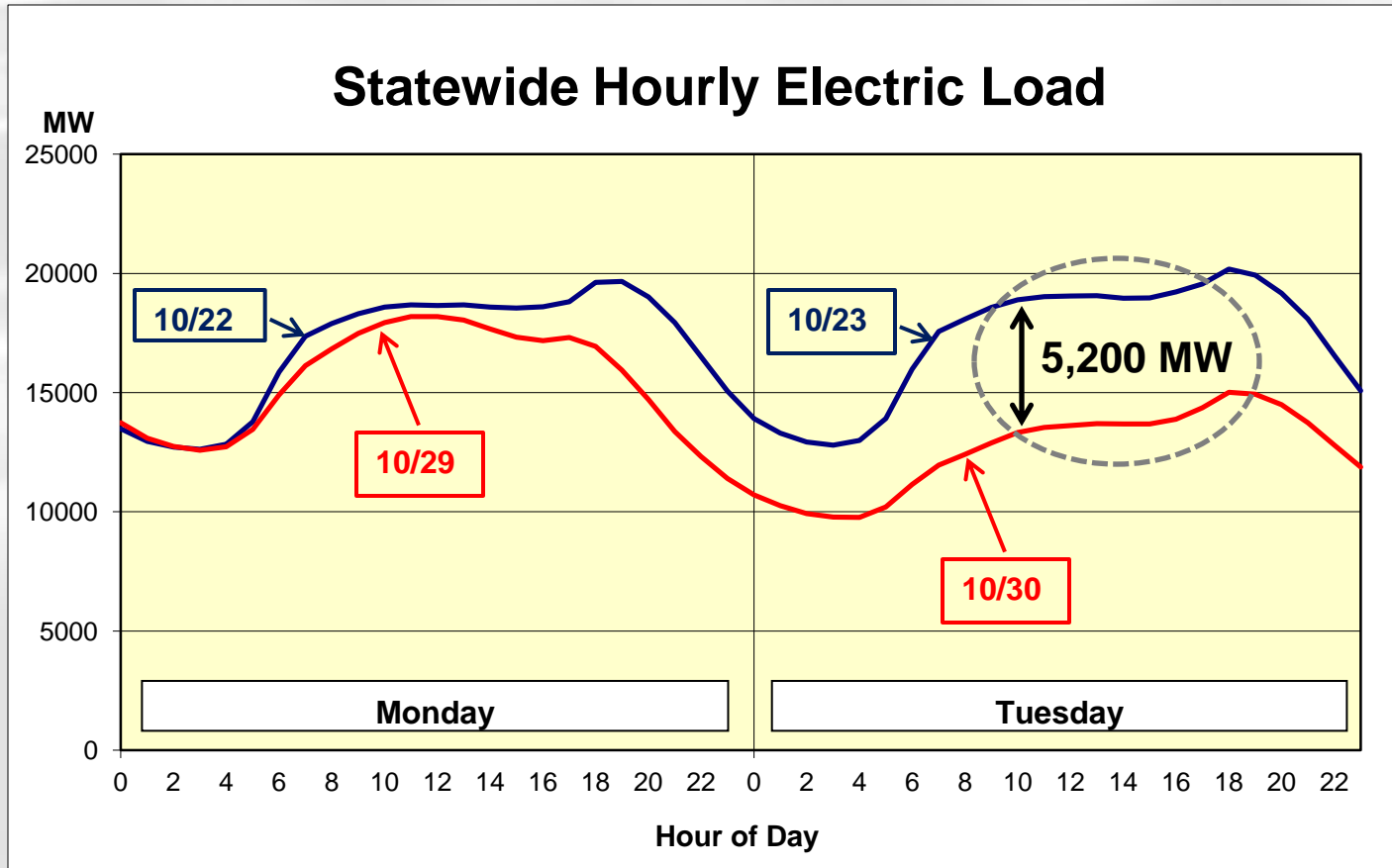
Transmission Outages

- **90+ transmission facility outages**
- **Long Island lost all ties to Connecticut and New Jersey**
- **New York City lost all ties to New Jersey**

Interconnection Status



Impact on Electric Load



After Sandy struck (Monday, Oct. 29 & Tuesday, Oct. 30), hourly electric load was ~ 5,200 MW below comparable levels from the previous week (Oct. 22-23)

Operations During Storm

- ◆ **Primary objective of operations during a major disturbance is to maintain the integrity of the interconnected system**
 - ◆ *Sustaining balance between generation and load to maintain 60 hertz*
 - ◆ *Maintaining power flows within stability, voltage, and thermal limits.*
 - ◆ *Power flows must be secured for the next worst contingency*
- ◆ **Declining load due to customer outages coincided with loss of generation, easing efforts to maintain system balance**

Post-Storm Assessment

- **None of the generator or transmission losses required load curtailments to maintain transmission security**
- **Despite lose of interconnections to New England and New Jersey, the New York Control Area remained connected to the Eastern Interconnection**
- **Throughout the storm and during recovery, NYISO and New York's utilities were able to operate within power transfer limits**
- **Communications and computer systems worked properly**

NY State Initiatives

- The New York State Public Service Commission ordered New York's major electric utilities to adopt reforms that included measures to:

- *Improve development and timely issuance of localized estimated restoration times*
- *Engage in an industry-wide effort to address deficiencies in the mutual assistance process*
- *Define procedures for responding to large-scale flooding events*



SOURCE: 2013 State of the State Address, Governor Andrew M. Cuomo, January 9, 2013

Rebuilding NY

- **Multi-faceted strategy to better protect New Yorkers from future extreme weather includes measures to:**
 - ***Harden Existing Electrical Grid***
 - ***Create Microgrids across NYS***



In January, Vice President Biden & Governor Cuomo unveiled the \$17 billion strategy

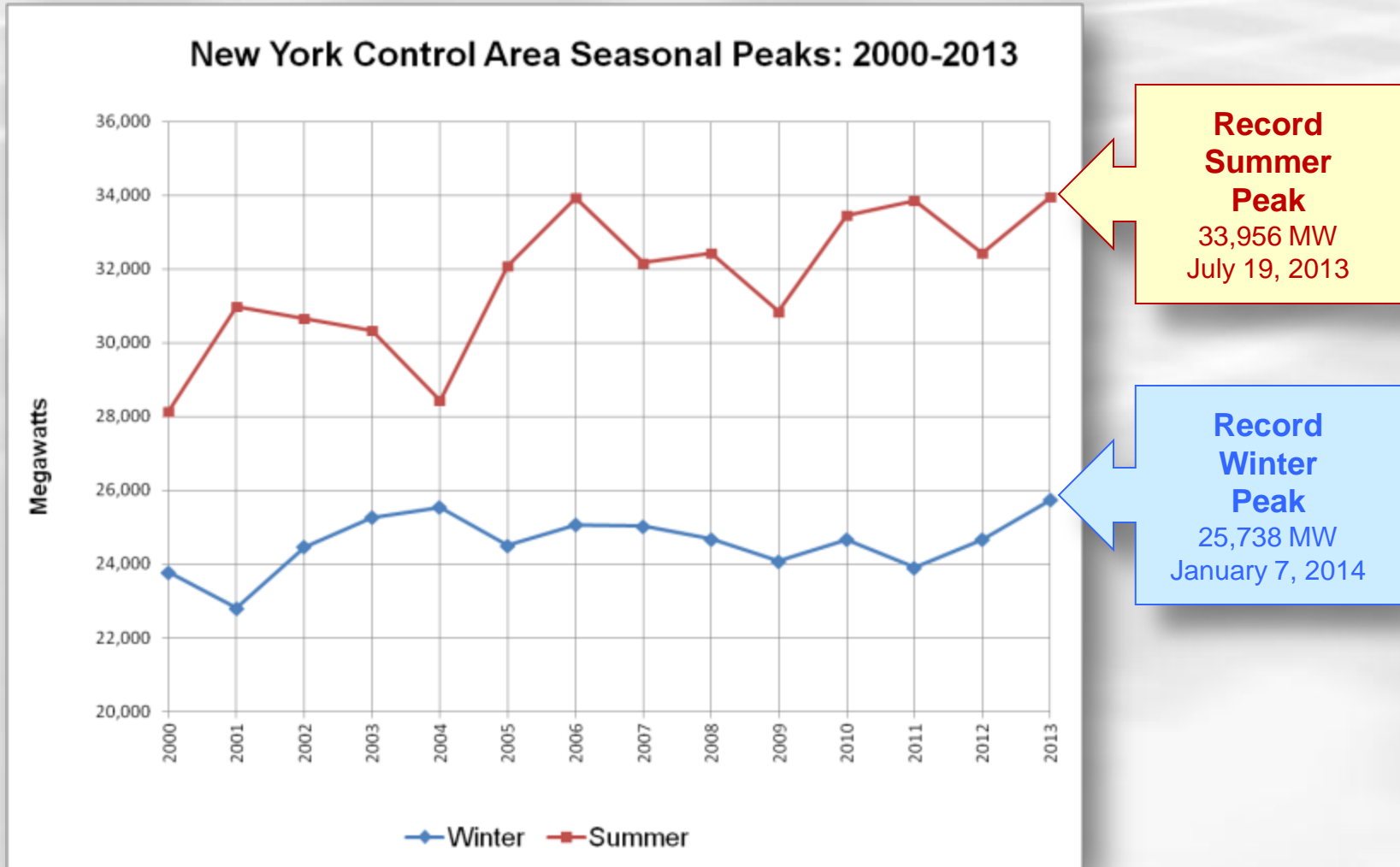
Winter Wake-Up Call

- **Winter 2013-2014 has included five major “Cold Snaps” including two Polar Vortex conditions that extended across much of the country**
- **On January 7, the NYISO set a new, all-time Winter Peak load of 25,738 MW**
 - *25,541 MW -- Prior winter all-time peak load set in 2004*
 - *24,709 MW -- “1 in 2” Forecast Winter Peak for 2013-14*
 - *26,307 MW -- “1 in 10” Forecast Winter Peak for 2013-14*
- **Many other ISOs and utilities set all-time Winter Peaks, including PJM, MISO, TVA, and Southern Company**

Winter Operations

- **Winter of 2013-2014 has been characterized by many days of gas prices exceeding oil prices -- resulting in high levels of economic scheduling of oil-fired generation**
- **Majority of oil-fired generation was able to be replenished by either barge or truck deliveries at rates close to their oil-burn rates**
- **Cooperation and accuracy of the daily fuel inventory information from generating stations was excellent**

Record Seasonal Peaks





The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.

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