

Voltage Coordination on High Voltage Grids

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The Roles of the NYISO



Reliable operation of the bulk electricity grid

- *Managing the flow of power nearly 11,000 circuit-miles of transmission lines from more than 300 generating units*

Administration of open and competitive wholesale electricity markets

- *Bringing together buyers and sellers of energy and related products and services*

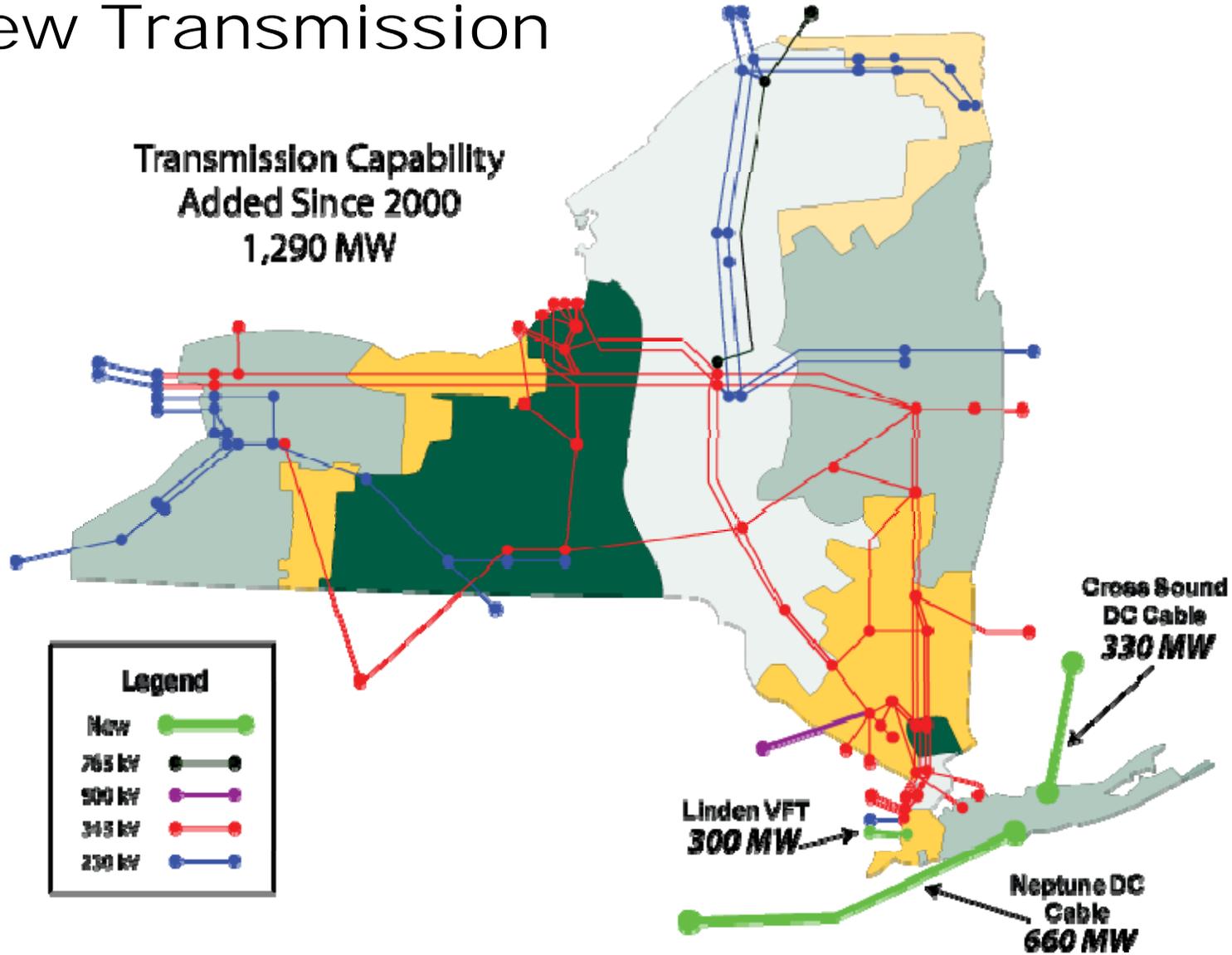
Planning for New York's energy future

- *Assessing needs over a 10-year horizon and evaluating projects proposed to meet those needs*

Advancing the technological infrastructure of the electric system

- *Developing and deploying information technology and tools to make the grid smarter*

New Transmission



Transmission Reactive Limits

- ◆ Pre and post contingency transmission voltage high limits are established by the NY Transmission Owners based on substation equipment ratings
- ◆ Post contingency transmission voltage low limits are established by the NY Transmission Owners based on customer voltage requirements
- ◆ Pre contingency transmission voltage low limits are established by the NYISO based on maintaining voltage limits post contingency
- ◆ Post contingency voltage collapse limits are established and secured in the form of transfer limits
- ◆ Desired voltage limits are mutually developed by the NYISO and NY Transmission Owners to minimize transmission losses

Pre-Scheduling Reactive Resources

- ◆ The NYISO coordinates reactive resource maintenance outages with Transmission Owners based on loads, predicted transfers, and in coordination with adjacent Balancing Authorities
- ◆ Occasionally Transmission Owners require pre-scheduling of local generation to secure lower voltage transmission substations
- ◆ The NYISO's **Security Constrained Unit Commitment (SCUC)** process considers the impact of transmission losses when determining optimal generating unit day-ahead commitment schedules
 - *The resulting Day-Ahead Locational Marginal Based Prices (LBMP) includes a marginal loss pricing component*

Real Time Reactive Resources

- ◆ **Security Constrained Economic Dispatch (SCD)** reflects the impact of transmission losses when determining optimal generating dispatch schedules.
 - *The resulting Day-Ahead Locational Marginal Based Prices (LBMP) includes a marginal loss pricing component*
- ◆ OPF technology could be used to aid in loss reductions on the transmission system
- ◆ The expected outcome of OPF technology is that the transmission system should normally be operated at the highest operating levels allowable by equipment ratings.
- ◆ The NYISO has worked with the NY Transmission Owners to develop “Desired High Voltage Limits” and has modified procedures to operate reactive resources to maintain actual transmission voltages as close to Desired High Voltage Limits as possible

Reactive Evaluation Applications

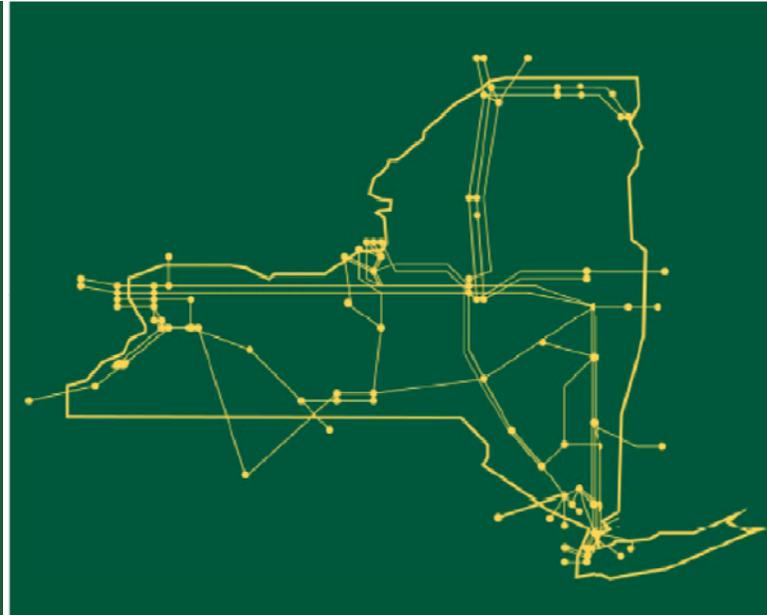
- ◆ **Real Time Voltage Monitoring**
 - *State estimator applications*
 - *Contingency evaluations*
 - *EMS SCADA monitoring and alarming applications*

- ◆ **Real Time Interface Flow Monitoring**
 - *Security Constrained Dispatch secures all interfaces, including voltage collapse interface limits every five minutes with pre and post contingency secure basepoints*
 - *EMS SCADA monitoring and alarming*

Reactive Resource Limitations

- ◆ There are many situations where the voltage at one transmission substation cannot be increased because an electrically adjacent substation would exceed a pre contingency high limit
- ◆ In off peak time periods, transmission voltages are close to pre-contingency high limits with all reactive resources switched out of service
- ◆ It is possible during non-peak load conditions for transmission bus voltages to be at or approaching pre-contingency high voltage limits at the same time actual Central East power flows are at or approaching the Central East Voltage Collapse interface limits prior to all transmission capacitors being in-service

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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