



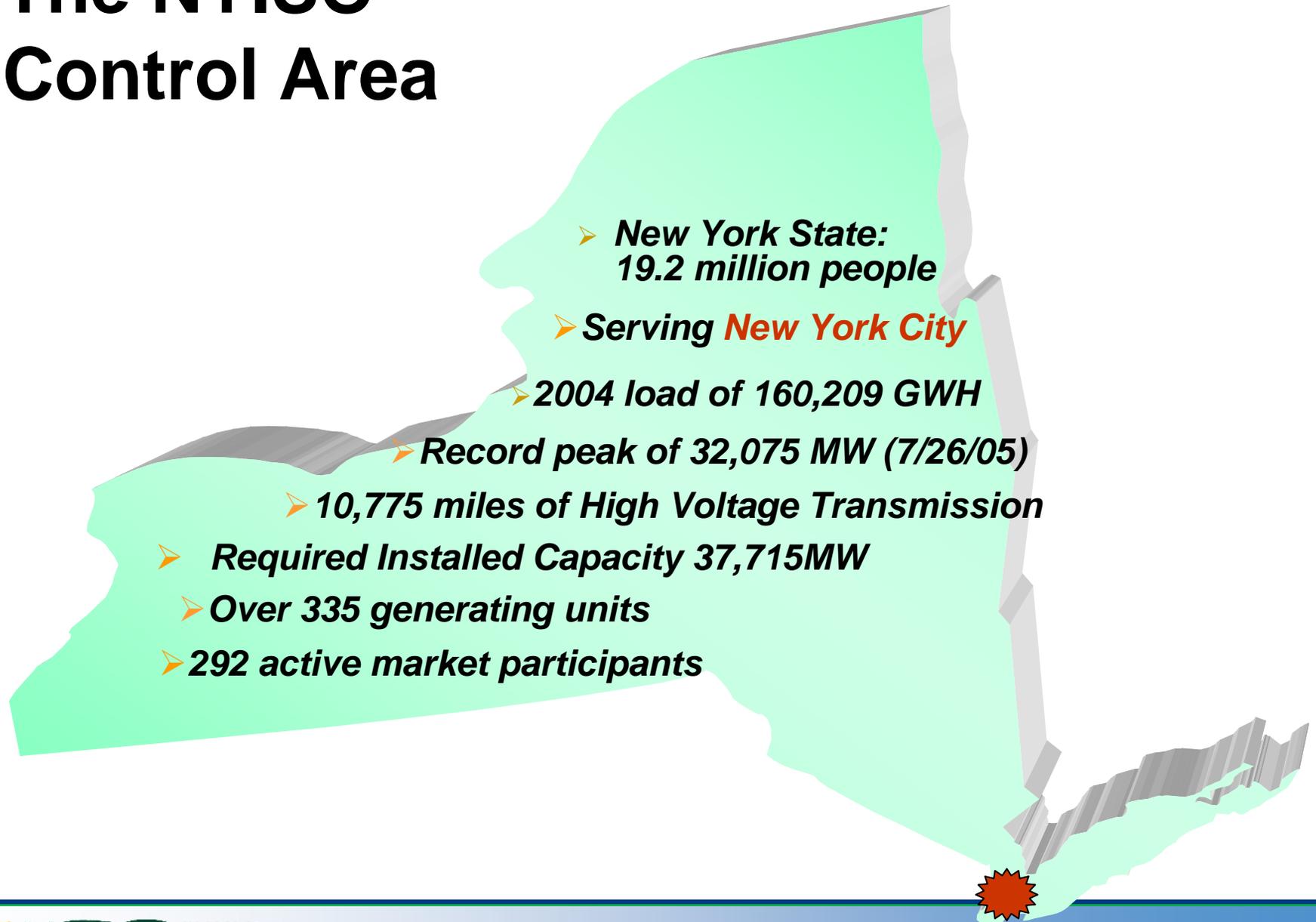
Building The Energy Markets of Tomorrow . . . Today

Joint Board Meeting on Security Constrained Economic Dispatch – Northeast Region

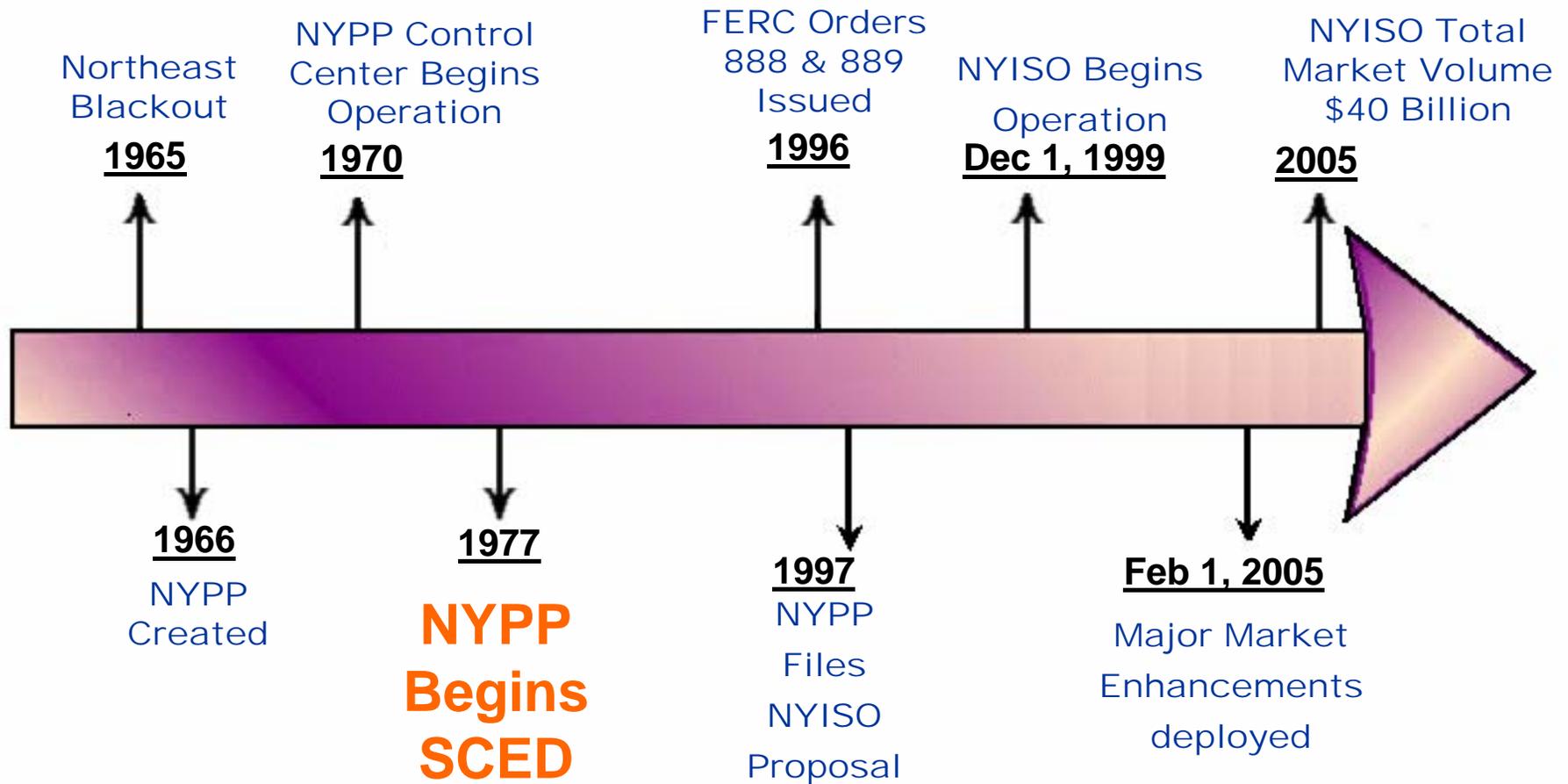
**Boston, MA
November 29, 2005
Mark Lynch, President and CEO**

The New York Independent System Operator and Security Constrained Economic Dispatch

The NYISO Control Area



Evolution of the NYISO



Markets Administered by the NYISO

- **Energy***
- **Reserves***
- **Regulation***
- **Installed Capacity (ICAP)**
- **Transmission Congestion Contracts (TCC's)**

* **Co-optimized in both Day-Ahead and Real-Time Markets**

New York State Overview

- The NYISO, as well as its predecessor organization the New York Power Pool (NYPP), have used security constrained economic dispatch (SCED) to control New York State generating resources since 1977
- Significant statewide benefits have been realized by the use of SCED under both NYPP and NYISO directed operation
- SCED provides the framework for the NYISO wholesale electricity marketplace and Locational Based Marginal Pricing (LBMP)
- SCED ensures that the most efficient set of resources will be used to meet reliability criteria in New York's highly congested bulk power system

New York State History - NYPP

➤ SCED resulted in:

- A more precise and automated economic dispatch method than the historical practice of pricing and scheduling of bilateral energy trades
- A more automated scheduling of economic energy among NYPP members which removed time constraints associated with bilateral energy trades
- The development of an Interchange Evaluation Program that facilitated external energy purchases and sales between New York, New England, PJM, and the Provinces of Quebec and Ontario
- A “Pool” operation which took advantage of NYPP members’ supply and load diversity
- A more efficient allocation of operating reserves among NYPP members

New York State History – NYPP *(continued)*

➤ Economic Benefits of SCED

➤ As an example, in 1981, the NYPP estimated economic savings of \$281 million were attributable to SCED and external economic energy transactions. This represented an overall 24 percent savings

➤ Assuming a conservative \$100 million/year benefit from SCED, over \$2 billion in savings can be attributed to SCED and external economic energy transactions from 1977 to 1999

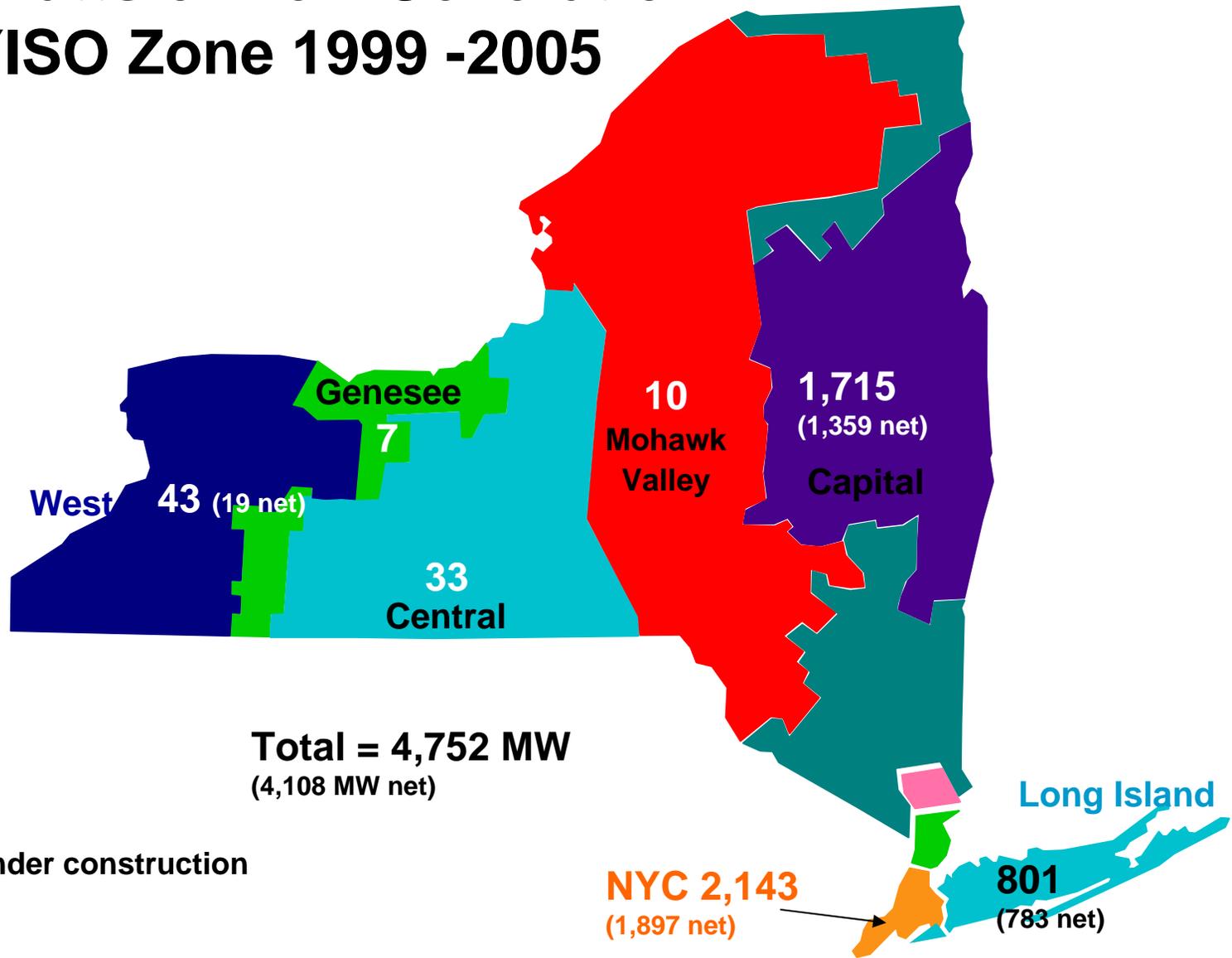
Benefits of SCED in the NYISO

- Beginning December 1, 1999, the NYISO has operated a fully co-optimized energy and ancillary services markets overlaid on a SCED framework
- This has provided:
 - Enhanced reliability in a frequently constrained system
 - Least total cost of electricity for consumers
 - A well functioning market that has encouraged significant participation
 - 292 active market participants in the NYISO

SCED Provides Basis for LBMP

- **SCED was retained as an essential tool to:**
 - **Automatically determine the most efficient set of generating resources to meet load requirements and transmission grid congestion**
 - **Produce LBMP reflecting load, transmission congestion and marginal losses**
- **SCED allows the establishment of LBMP for both Day-Ahead and Real-Time markets (two settlement system)**
- **SCED supports LBMPs that provide transparency of prices and allow congestion costs to be managed using financial hedging tools**
- **LBMP provides economic signals for the location of new capacity**

Megawatts of New Generation* by NYISO Zone 1999 -2005



*Built or under construction

Responses to Joint Board Questions

What are the benefits and cost of SCED, compared to the previous system used for dispatch or other potential alternatives?

For New York:

- Inefficiencies in the pricing and scheduling of bilateral blocks was replaced by more precise economic dispatching methods
- Automatic scheduling of resources removed time constraints associated with bilateral transaction scheduling
- Provided a process to evaluate purchases and sales from neighboring control areas
- The costs of implementing SCED were those associated with the formation of a central dispatch organization and supporting infrastructure

What specific benefits has SCED offered? Can you quantify these benefits and if so, please do.

- Significant savings result from the use of SCED. In 1981, the NYPP estimated savings of \$281 million statewide. This translates into a savings of over \$600 million in 2005 dollars
- In February of 2005, an enhanced SCED platform was implemented which provides for:
 - A real-time unit commitment function capable of performing economic commitment decisions every 15 minutes for “Quick-Start” resources such as gas turbines and hydro units
 - An enhanced multi-interval, 2½ hour look-ahead co-optimized solution to meet both Energy and Ancillary Services Markets (Operating Reserves and Regulation)
 - A full two settlement Ancillary Services Market (Day-Ahead forward and Real-Time) supplementing the existing two-settlement Energy Marketplace
 - A two settlement Energy and Ancillary market design that provides for generating units needed to meet reliability criteria are committed day-ahead so that they will be available in real-time operation

What lessons did you learn in implementing SCED?

- **SCED has proven to be very effective in automatically selecting the most efficient set of generating resources to meet system requirements**
- **SCED is an invaluable tool to address transmission system congestion in highly constrained areas. Frequent congestion requires a precise and automated efficient way of dispatching units**
- **Beginning in June 2002, the NYISO began using SCED to provide for operational control of NYC area generating resources by including the nine NYC load pockets as security constraints**

What lessons did you learn in implementing SCED? (continued)

- Historically, System Operators had used manual dispatch directives for generating units in NYC and these units were paid their bid cost. This resulted in significant uplift costs in NYC
- Since June 2002, LBMPs have reflected the congestion costs of NYC transmission constraints and NYC uplift costs were significantly reduced (82% reduction in real-time uplift in 2003 from 2002)
- LBMPs that reflect congestion costs in the real-time energy spot market are more transparent and these congestion costs can be better managed using financial congestion hedging tools

How does the operation of SCED relate to the operation of the regional market?

- **SCED is essential to operate our regional market**
- **SCED uses a co-optimized economic dispatch solution that results in the lowest generation production cost to meet both energy and ancillary services (operating reserve and regulation) market requirements**
 - **Marginal clearing prices for energy and ancillary services are derived directly from SCED in both the Real-Time and Day-Ahead Markets**
- **SCED provides an optimal dispatch that allows transparency and predictability to the marketplace**

How would a market operate in your region without SCED?

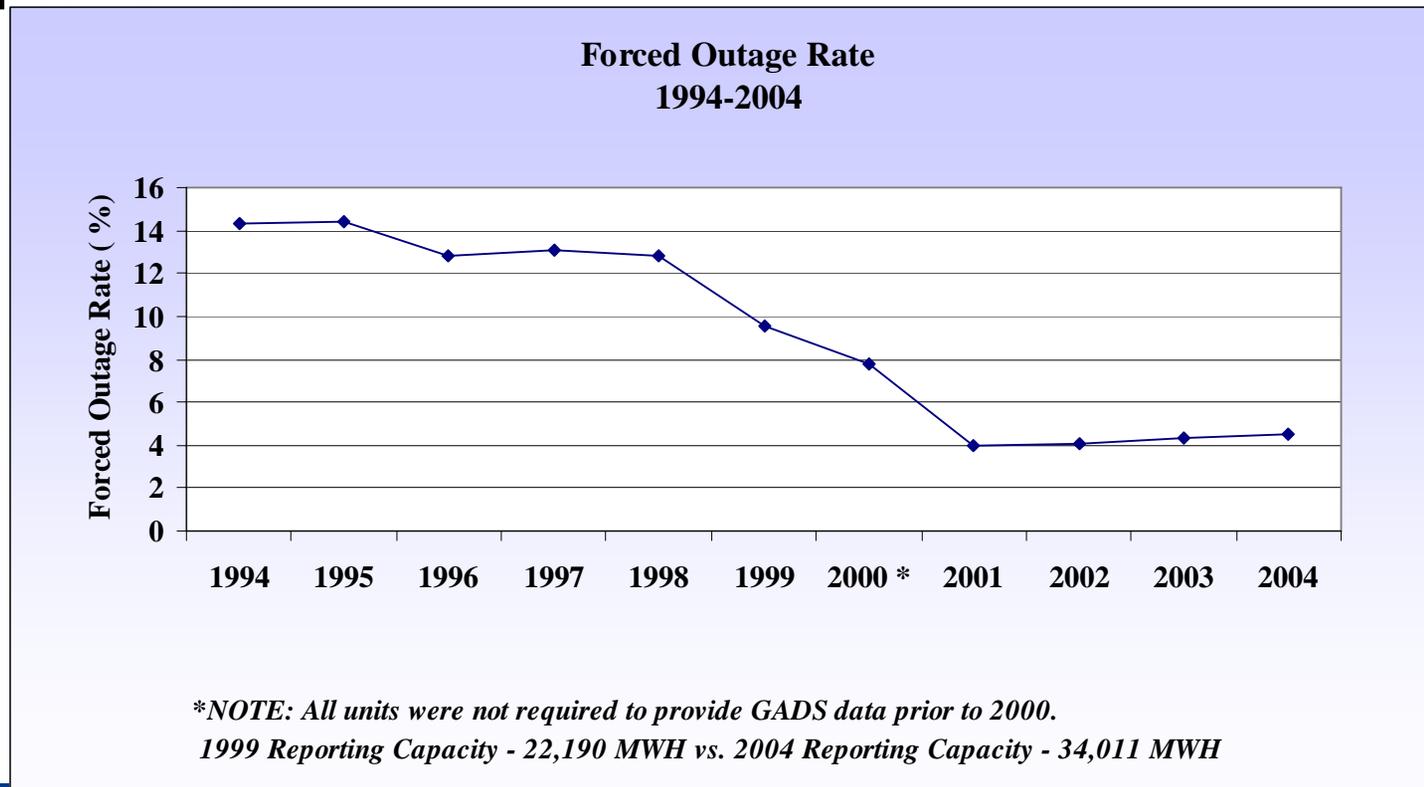
- **The NYISO markets for energy and ancillary services would function very inefficiently, if at all**
- **Reliability Coordinators would be required to address transmission limitations using manual intervention**
- **There would be no LBMPs as these prices are determined by the NYISO's economic dispatch**

What effect has SCED had on the reliability of the electric system in your region?

- In the Real-Time Market, SCED automatically dispatches resources every five minutes to ensure that reliability criteria are satisfied in the most efficient manner
- The NYISO operates a Day-Ahead Market, that provides commitment of generating units needed to meet reliability criteria day-ahead so that they will be available in real-time operation

Can you quantify the effect?

- The combined effect of SCED and LBMP has provided the appropriate market signals leading to substantially improved availability of generating units, especially during peak conditions



What effect has SCED had on the cost of electric energy in your region, after adjusting for input costs such as fuel?

- SCED has resulted in significant production cost savings since its implementation in 1977 under NYPP
- NYISO operations has provided additional savings through the utilization of central unit commitment
- In 1981, the NYPP had a estimated savings of \$281 million statewide. This translates into a savings of over \$600 million annually in 2005 dollars
- The fuel adjusted New York average cost of energy and ancillary services has declined 5 percent from 2000 to 2004

How can RTO's SCED resources be more optimally dispatched?

New York's Experience – NYISO Market Initiatives Enhance the Benefits of SCED:

- Co-optimize energy and ancillary service markets
- Shorten the evaluation period for real-time unit commitment
- Bid production cost guarantees to minimize financial risk for suppliers following dispatch instructions
- Provide SCED with forward looking multi-interval optimization

Looking Forward:

- Improved regional dispatch efficiency among Northeast energy marketplaces
 - Investigate intra-hour transaction scheduling potential among existing ISO/RTO control areas and across international boundaries
- Improved models and market rules to more accurately reflect system operations

Conclusions

- **SCED has provided significant cost savings and benefits since 1977 in New York**
- **Overlaying a market on SCED framework has offered significant additional benefits based on a LBMP system**
- **SCED is an essential tool to efficiently operate the bulk power system and wholesale energy markets**