

# Congestion Impact Calculation Update

NYISO ESPWG  
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# Current Tasks

## First Priorities

- 2003 Congestion Impact Calculation ✓
- Define an “Unusual Day” Analysis Approach ✓
- Align SCUC and PROBE Modeling
- Document Process and Results Interpretation
- Collect 2004 Data

## Next Priorities

- Develop Automated SCUC – PROBE Results Comparison
- Automate Calculation Process
- Report Metrics Monthly Going Forward

## PROBE Lite Status

- Runs an Improved and Same Unit Commitment as PROBE
- Run Time (Full Unit Commitment and Optimization – 1 min./day)
- Improved TCC Data File Being Prepared for PROBE Use



# Congestion Impact Reporting Metrics

- Annual Total or Year-to-Date
- Monthly Totals

	Report By			
	NY Total	Zones	Monitored Element	Contingency
Generation & Import Bid Production Cost	✓	✓	No	No
Total Load Payment	✓	✓	✓	✓
TCC Credit Lost Due to No Constraints	✓	✓	✓	✓
Net Load Payments Due to Congestion	✓	✓	✓	✓
Total Load Congestion Payments	✓	✓	✓	✓
Load Congestion Payments TCC Hedge	✓	✓	✓	✓
TCC Unhedged Load Congestion Payments	✓	✓	✓	✓
Total Generation & Import Payment	✓	✓	✓	✓



# PRELIMINARY 2003 New York Congestion

Hedging Calculations Pending Data Improvements

All Calculations Are Constrained – Unconstrained Values

## Societal Impact

The SCUC Minimization Objective

## Payments Impact

Energy, Losses, & Congestion Components Change

Mitigated Bid Production Cost	
Zone	Impact
CAPITL	-\$6,917,660
CENTRL	-\$37,296,001
DUNWOD	-\$426,845
GENESE	-\$2,506,666
HUDVL	-\$26,920,349
LONGIL	\$91,486,908
MHKVL	-\$7,843,742
MILLWD	-\$143,557
N.Y.C.	\$230,180,809
NORTH	-\$703,866
WEST	-\$18,054,601
<b>Total within NY</b>	<b>\$220,854,430</b>
HQ	-\$44,390,612
NPX	-\$6,107,305
OH	-\$13,586,305
PJM	-\$79,518,725
<b>Total outside NY</b>	<b>-\$143,602,947</b>
<b>NY Total</b>	<b>\$77,251,483</b>

## Bills Impact

Energy, Losses, & Congestion Components Change

Load Payment	
Zone	Impact
CAPITL	-\$25,958,020
CENTRL	-\$39,194,088
DUNWOD	-\$19,421,296
GENESE	-\$37,310,760
HUDVL	-\$3,150,552
LONGIL	\$158,854,999
MHKVL	-\$19,117,713
MILLWD	-\$10,449,130
N.Y.C.	\$476,104,459
NORTH	-\$12,212,474
WEST	-\$52,335,702
<b>Total</b>	<b>\$415,809,723</b>

## Accounting Impact

LMP, Congestion Component Change ONLY

Congestion Payment	
Zone	Impact
CAPITL	\$14,062,722
CENTRL	\$1,697,534
DUNWOD	\$2,977,364
GENESE	\$1,554,762
HUDVL	\$7,322,645
LONGIL	\$241,711,428
MHKVL	\$166,427
MILLWD	\$2,141,459
N.Y.C.	\$680,454,682
NORTH	-\$35,728
WEST	-\$322,197
<b>Total</b>	<b>\$951,731,098</b>

Generator Payment	
Zone	Impact
CAPITL	-\$21,668,946
CENTRL	-\$122,527,967
DUNWOD	-\$37,367
GENESE	-\$18,667,334
HUDVL	-\$44,939,521
LONGIL	\$182,990,053
MHKVL	-\$15,349,121
MILLWD	-\$46,687,562
N.Y.C.	\$348,238,524
NORTH	-\$25,590,028
WEST	-\$98,285,516
<b>Total within NY</b>	<b>\$137,475,215</b>
HQ	-\$51,487,197
NPX	-\$10,753,439
OH	-\$38,255,447
PJM	-\$124,259,905
<b>Total outside NY</b>	<b>-\$224,755,988</b>
<b>NY Total</b>	<b>-\$87,280,773</b>

+ Number Means Congestion Increases Load Cost

+ Number Means Gen Payments Went Up Due to Congestion



# PRELIMINARY 2003 New York Congestion Load & Congestion Payments by Constraint

## Hedging Calculations Pending Data Improvements

### A Positive Number Means Congestion Costs Load

**Top 10 2003 Load and Congestion Payment by Monitored Facility**

Transmission Facility	Load Payment	Congestion Payment	% of Total	Cum % of Total
RAINEY_ 345 DUNWODIE 345	\$84,465,138	\$193,329,049	20%	20%
W49TH_ST 345 SPRNBRK_ 345	\$83,924,738	\$192,092,148	20%	40%
RAINEY_ 138 VERNON_ 138 1	\$70,887,696	\$162,252,157	17%	58%
DUNWODIE 345 SHORE RD 345 1	\$66,192,423	\$151,505,326	16%	73%
CENTRAL EAST - VC	\$44,180,017	\$101,121,965	11%	84%
LEEDS_ 345 N.SCTLND 345 1	\$22,377,200	\$51,218,324	5%	89%
E179THST 138 HELLGT_E 138 1	\$20,427,908	\$46,756,664	5%	94%
UPNY CONED	\$8,164,762	\$18,688,013	2%	96%
HUDS_AVE 138 JAMAICA_ 138	\$6,957,703	\$15,925,223	2%	98%
HELLGATE 138 E179THST 138 1	\$4,591,813	\$10,510,027	1%	99%

**Top 12 2003 Load and Congestion Payment by Contingency**

Contingency	Load Payment	Congestion Payment	% of Total	Cum % of Total
Base Case	\$125,860,068	\$288,076,335	30%	30%
SCB: SPBK	\$62,508,521	\$143,073,381	15%	45%
MTN:SCB SPBK	\$42,278,368	\$96,769,352	10%	55%
DUNWODIE345 RAINEY	\$40,556,958	\$92,829,283	10%	65%
SPRNBR EGRDNCTY	\$39,753,864	\$90,991,110	10%	75%
SCB: GOETH(8): 42 26 21 GOW	\$37,092,999	\$84,900,757	9%	84%
W49TH_ST345_E13THSTA345	\$18,728,668	\$42,867,337	5%	88%
TWR: 22 21 A2253	\$18,200,660	\$41,658,800	4%	93%
MTN:SCB1 R391OR R94301 O/S LE	\$13,996,242	\$32,035,467	3%	96%
N.SCTLND345 LEEDS	\$8,380,958	\$19,182,857	2%	98%
SPRNBRK_345_W49TH_ST345_M51	\$3,165,705	\$7,245,861	1%	99%
BUS: E F BARRET	\$2,858,473	\$6,542,651	1%	99%

Base Case	
Contingency	
Congestion Impacts	
Interfaces	41%
Zone J	36%
Zone K	23%



# PRELIMINARY 2003 New York Congestion Generation Payments by Constraint

## Hedging Calculations Pending Data Improvements

### A Positive Number Means Congestion Pays Suppliers

**Top 12 2003 Generation Payment by Monitored Facility**

Monitored Facility	Generation Payment	% of Total	Cum % of Total
DUNWODIE 345 SHORE RD 345 1	-\$22,063,067	22%	22%
W49TH_ST 345 SPRNBRK_ 345	-\$16,863,859	17%	40%
CENTRAL EAST - VC	-\$15,361,405	16%	55%
RAINEY_ 345 DUNWODIE 345	-\$13,234,602	13%	69%
RAINEY__ 138 VERNON__ 138 1	-\$13,195,085	13%	82%
LEEDS__ 345 N.SCTLND 345 1	-\$7,940,656	8%	90%
E179THST 138 HELLGT_E 138 1	-\$2,722,707	3%	93%
UPNY CONED	-\$2,108,681	2%	95%
HUDS AVE 138 JAMAICA 138	-\$945,715	1%	96%
HELLGATE 138 E179THST 138 1	-\$562,195	1%	97%
PLSNTVLY 345 LEEDS__ 345 1	-\$550,981	1%	97%
JAMAICA 138 VALLYSTR 138 1	-\$525,584	1%	98%

**Top 12 2003 Generation Payment by Contingency**

Contingency	Generation Payment	% of Total	Cum % of Total
Base Case	-\$28,055,588	31%	31%
SPRNBR49345_EGRDNCTY345	-\$12,370,043	14%	45%
SCB: SPBK	-\$11,487,593	13%	58%
MTN:SCBSPBK	-\$8,527,025	9%	67%
SCB: GOETH(8): 42 26 21 GOW	-\$7,239,065	8%	75%
DUNWODIE345_RAINEY	-\$6,406,576	7%	82%
MTN:SCB1_R391OR_R94301_O/S_LE	-\$5,003,385	6%	88%
W49TH_ST345_E13THSTA345	-\$3,014,511	3%	91%
N.SCTLND345_LEEDS	-\$2,937,271	3%	95%
TWR: 22 21 A2253	-\$2,671,369	3%	98%
SPRNBRK 345 W49TH_ST345 M51	-\$453,665	1%	98%
BUS: E F BARRET	-\$398,405	0%	98%



# Handling “Unusual Days” Approach

1. Use a Statistical Approach to Identify Days with an Unusual Amount of Congestion Impact
2. Define Congestion Impact Using the Primary Congestion Measure (Constrained – Unconstrained) Mitigated Bid Production Cost
3. Analyze and Characterize Why the Days Were Unusual
4. Report Congestion Metrics Separately for “Unusual Days”



# Recommended Unusual Day Identification Approach

A Day is Unusual If We Are 95% Confident the Day's High (Congestion \$)/(Average MWhr) Variation is Higher than Other Variation for ANY of These Factors:

- Load Level in 10% Increments
- For the Season
- For the Day-of-the-Week

- Impact of the Selection Approach

**99% Certain Unusual Day Selection Selection Criteria**

Load	Season	Day of Week
1/2/03	1/2/03	
1/3/03	1/3/03	1/3/03
1/24/03	1/24/03	1/24/03
3/3/03	3/3/03	3/3/03
5/17/03	5/17/03	5/17/03
		8/12/03
8/14/03	8/14/03	8/14/03
		8/15/03
9/7/03		
10/22/03	10/22/03	

Recommended Approach

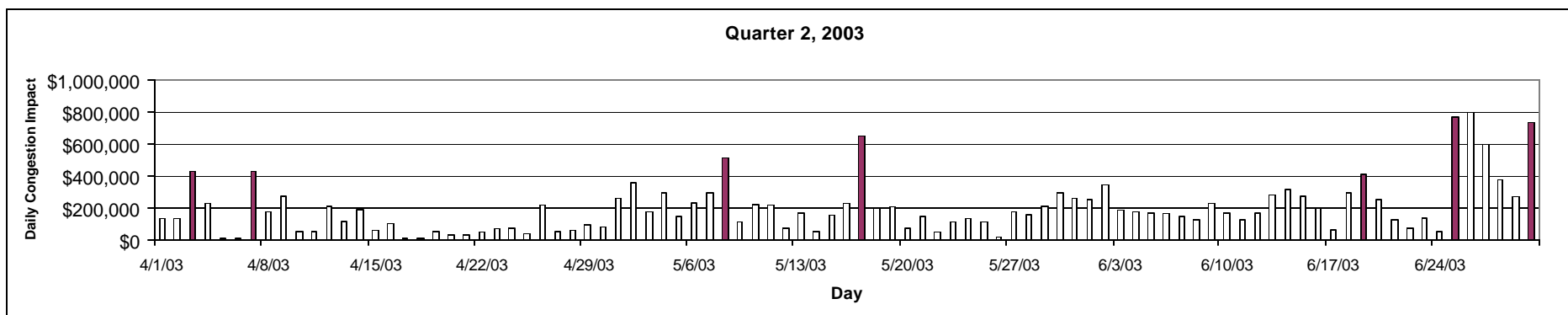
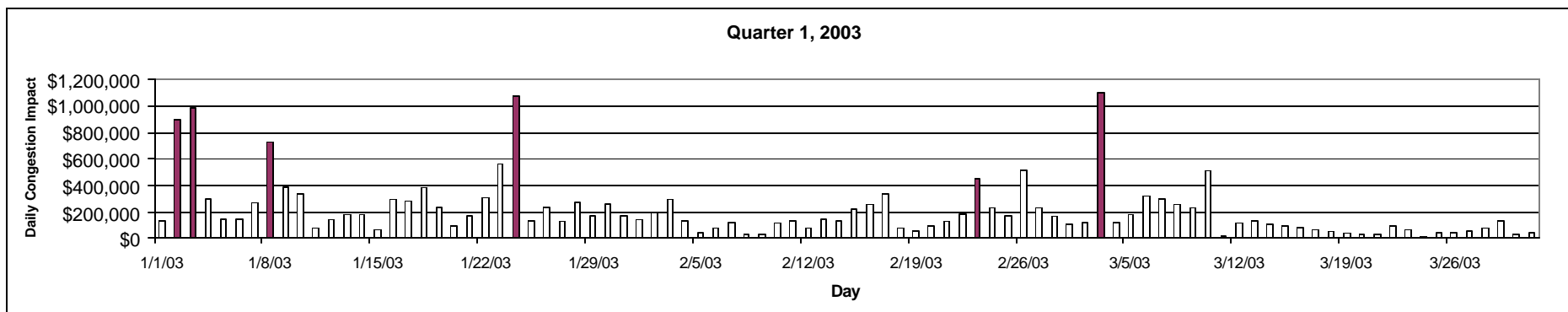
	99% Confident	95% Confident	68% Confident	Load Level Only 95% Confidence	Seasonal Only 95% Confidence	Day of Week Only 95% Confidence
Number of Unusual Days	10	27	72	16	16	20
Total Unusual Days Congestion Impact	\$9,342,245	\$19,045,298	\$34,135,239	\$12,186,495	\$13,056,602	\$16,226,821
Unusual Days % of Total Congestion	12%	25%	44%	16%	17%	21%





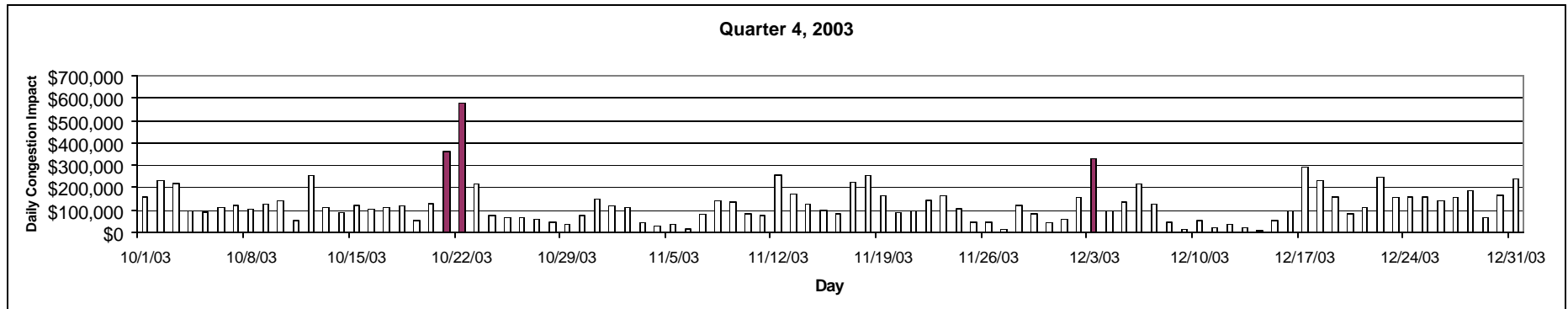
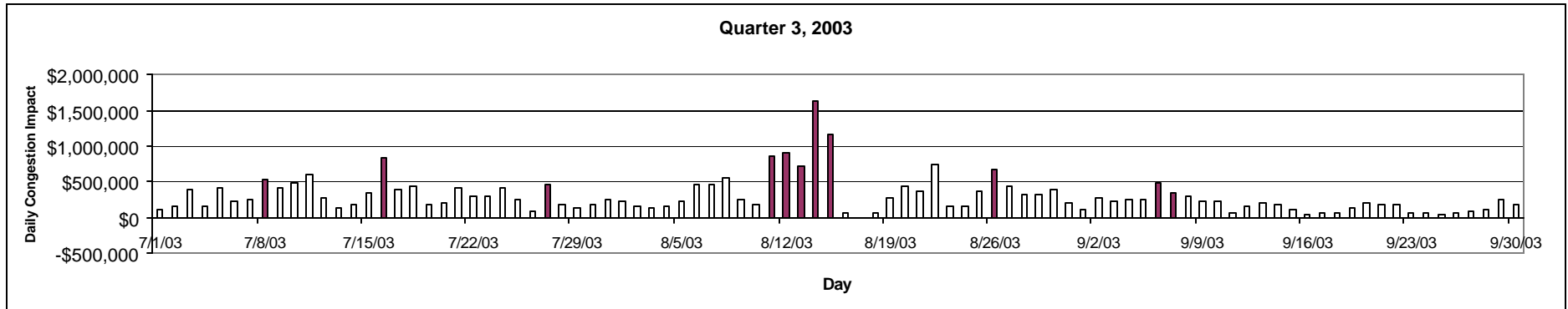
# 2003 Unusual Day Identification

Daily Congestion Impact is Measured by  
Change in Mitigated Bid Production Cost



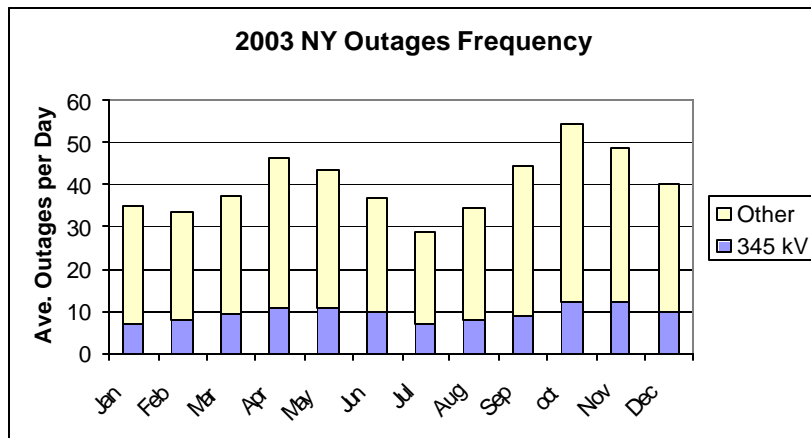
# 2003 Unusual Day Identification

Daily Congestion Impact is Measured by  
Change in Mitigated Bid Production Cost



# Identifying Unusual Outages

- Examine Web Posted DAM Outage List
- Find Max Duration Outage of 345 kV Facilities for Year
- Classify Outage Type by 345 kV Outage Duration



## Outage Classification Table

Maximum 2003 345 kV Outage Duration Range(days)

From	To	Type	Number in 2003
0	3	Intermittent	110
4	14	Maintenance	58
15	60	Unusual	17
61	365	Normal	3



# Unusual Days and Congestion Information 2003

## 2003 Unusual Days

Date	MBPC Congestion Impact	Average Load MW	Sigma	Outages	345 kV Outages	# of Unusual Outages	Unusual Outages(see key)
8/14/2003	\$1,639,844	20,028	4.8	44	14	2	i j
8/15/2003	\$1,168,172	20,292	3.1	35	8	2	i j
3/3/2003	\$1,102,554	16,891	4.4	41	13	5	n g f k h
1/24/2003	\$1,069,566	17,775	3.7	39	8	0	
1/3/2003	\$989,239	16,382	3.7	32	10	3	n f g
8/12/2003	\$899,379	19,102	4.2	31	6	0	
1/2/2003	\$897,509	16,242	3.3	33	5	1	n
8/11/2003	\$863,337	19,015	2.8	41	10	2	i j
7/16/2003	\$834,651	18,160	2.9	28	5	0	
6/25/2003	\$772,154	18,838	2.4	32	7	1	d
6/30/2003	\$732,647	17,651	2.4	32	5	1	d
1/8/2003	\$727,111	16,612	2.7	43	11	3	n g f
8/13/2003	\$709,377	19,282	2.0	38	12	2	i j
8/26/2003	\$673,014	18,597	3.0	38	8	2	i j
5/17/2003	\$652,837	12,878	4.6	37	17	2	g f
10/22/2003	\$577,021	15,064	5.2	66	10	4	c i j b
7/8/2003	\$538,248	18,967	2.1	30	5	1	d
5/8/2003	\$514,465	14,762	2.8	48	12	2	g f
9/6/2003	\$480,078	14,627	2.3	35	10	1	i
2/23/2003	\$452,356	14,629	2.9	31	14	2	k h
7/27/2003	\$447,725	17,408	2.1	29	9	2	i j
4/7/2003	\$427,688	15,684	2.8	54	10	2	e l
4/3/2003	\$426,707	14,702	2.1	44	7	2	e l
6/19/2003	\$409,284	15,936	2.5	34	13	1	d
10/21/2003	\$363,840	14,886	2.8	65	9	4	c i j b
9/7/2003	\$346,124	14,246	3.0	34	9	3	o i j
12/3/2003	\$330,371	16,532	2.1	49	15	5	g f c a m

Yellow indicates a 99% Confidence Unusual Day

MBPC - Mitigated Bid Production Cost  
Sigma - Variance of the Days Cong \$/MW, normalized to the sample grouped by Load, Season, or Day-of-Week

### Unusual Outages Key

- a DUNWODIE345\_RAINEY\_\_345\_71\_\_\_\_LN
- b DUNWODIE345\_RAINEY\_\_345\_72\_\_\_\_LN
- c E13THSTA345DFARRAGUT345A48\_\_\_\_LN
- d EDIC/PTR\_345\_230\_BK\_2E\_\_\_\_XF
- e EDIC/PTR345\_N.SCTLND345\_14-EN\_LN
- f EGRDNCTY\_345B\_138\_BK\_2\_\_\_\_XF
- g EGRDNCTY\_345C\_345B\_PAR2\_\_\_\_PS
- h FARRAGUT\_345B\_345A\_TR11\_\_\_\_PS
- i GOETHSLN\_345A\_345B\_BK\_1N\_\_\_\_PS
- j GOETHSLN\_345B\_230\_BK\_1\_\_\_\_XF
- k HUDSON\_2345\_FARRAGUT345BB3402\_LN
- l LADENTWN345\_BUCHAN\_S345\_Y88\_\_\_\_LN
- m OSWEGO\_345\_VOLNEY\_\_345\_11-OV\_LN
- n RAINEY\_\_345\_FARRAGUT345A61\_\_\_\_LN
- o TREMONT\_\_345\_\_138D\_BK\_12\_\_\_\_XF



## Unusual Days Part of the Preliminary 2003 Congestion Metrics

### New York 2003 Unusual Day Portion of Congestion Metrics

Bid Production Cost Change	Impact	% of all 2003
99 % Confident Unusual	\$9,703,053	13%
99% to 95 % Confident Unusual	\$9,342,245	12%
Not Unusual days	\$58,206,184	75%

Load Payments	Impact	% of all 2003
99 % Confident Unusual	\$45,490,007	11%
99% to 95 % Confident Unusual	\$28,056,635	7%
Not Unusual days	\$342,263,081	82%

Congestion Payments	Impact	% of all 2003
99 % Confident Unusual	\$97,206,520	10%
99% to 95 % Confident Unusual	\$71,247,322	7%
Not Unusual days	\$783,277,256	82%

Generation Payments	Impact	% of all 2003
99 % Confident Unusual	\$3,060,104	-4%
99% to 95 % Confident Unusual	-\$8,817,920	10%
Not Unusual days	-\$81,522,957	93%



## Observations and Conclusions Congestion Impacts

- **2003 Congestion Impacts Close to Completion**
  - Hedging Calculations Pending TCC Data Improvements
- **2004 Data Received (Jan – Mar) and Awaiting Analysis**
- **2003 Observations**
  - Absent A Bidding Response, The Minimum Savings From Eliminating All Congestion Is \$77 Million per Year for New York State
  - Congestion Only Negatively Impacted Zones J and K Load\*
  - Transmission in Zones J and K, plus the Central East Interface Were the Primary Congestion Causes\*

**\* Assumes Relief of All New York State Constraints. Relieving Only Some Constraints May Shift the Congestion Impact to Other Zones, Not Eliminate Congestion Impact**



## Observations and Conclusions Unusual Days

- **The Proposed Unusual Days Identification Scheme**
  - **Isolated 27 Days With an Unusual Amount of Congestion**
  - **The 27 Days of Unusual Congestion Represented About 25% of the Total Congestion Impact \*\***

**\*\* Ignoring the Unusual Congestion Days in the Annual Sum Overestimates the Effect. Another “Normal” Constraint Will Likely Cause Congestion if the “Unusual Event” Had Not Occurred**

