NEW YORK INDEPENDENT SYSTEM OPERATOR

Credit Requirements: Disaggregated Virtual Trading and Trading Hubs

Market Issues Working Group

December 4, 2008

NEW YORK INDEPENDENT SYSTEM OPERATOR

Disaggregated Virtual Trading (DVT)

DVT Background

- Ensure credit requirements appropriately match risk based on DVT market design
- Apply similar logic and methodology as Virtual Transaction credit requirements approved by the Management Committee on October 29, 2008
- Establish credit requirements at the nodal level for all identified nodes within the DVT market design

DVT Credit Requirements

Nodal Virtual Supply Credit Requirements

	Summer	Winter	Rest-of-Year
Node A			
HB 7-10	S -1	S -7	S -13
HB 11-14	S -2	S -8	S -14
HB 15-18	S -3	S -9	S -15
HB 19-22	S -4	S -10	S -16
Night	S -5	S -11	S -17
Weekends/Holidays	S -6	S -12	S -18

Nodal Virtual Demand Credit Requirements

	Summer	Winter	Rest-of-Year
Node A			
HB 7-10	D -1	D -7	D -13
HB 11-14	D -2	D -8	D -14
HB 15-18	D -3	D -9	D -15
HB 19-22	D -4	D -10	D -16
Night	D -5	D -11	D -17
Weekends/Holidays	D -6	D -12	D -18

- Credit requirements will be calculated at the 97th percentile for each node based on the time-of-year and time-of-day
- Each DVT node will have 36 distinct credit requirements
- Nodal credit requirements will be updated and posted for Market Participants each month on the same schedule as zonal credit requirements

Next Steps

- Continue to work with Energy Markets Products on the progression of the DVT design
- Evaluate the feasibility of implementation based on the system performance impact to the Credit Management System (CMS)
- Provide updates to MIWG on status of credit requirements, as necessary
- Formally bring proposal for DVT credit requirements to BIC and MC for vote following a more detailed discussion at a future MIWG

NEW YORK INDEPENDENT SYSTEM OPERATOR

Trading Hubs

Overview

- Ensure credit requirements are appropriate for the risk associated with all pending settlements for Trading Hub transactions (aka Netting of Bilaterals)
- Credit requirements will be based on the risk associated with DAM and Real Time transactions
- TUC charges and unbalanced transactions incurring energy charges are treated separately; each charge will have distinct credit requirements reflecting the potential financial exposure for each type of transaction

DAM Approach

- The proposed approach to defining credit requirements for bilateral transactions entailing net purchases or sales in the DAM involves the following:
  - *Calculating a historical ratio of DAM prices to forward gas prices for each NYISO zone for each month; calculations will be based on a rolling three years of data and updated annually to reflect changes in the relationship between power and gas prices in each zone*
  - *Applying the ratios prospectively to determine the credit requirement for net purchases to support bilateral transactions in the DAM*

DAM Approach – Ratio Calculation

- The NYISO would calculate the average DAM price for each of the six periods in the month (m), for each zone (j), and for each year (t) [P_{pmjt}] for every month within the period
- The result would be a table of 120 values for each month based on 11 zones plus 9 proxy buses for 6 time periods:
  - *HB 7-10*
  - *HB 11-14*
  - *HB 15-18*
  - *HB 19-22*
  - *Night*
  - *Weekends & Holidays*
- Each of the 120 values represents a numerator value for the historical ratio

DAM Approach – Ratio Calculation

- The NYISO will utilize the corresponding prompt month futures price for natural gas at Henry Hub to calculate the denominator of the historical ratio (P_{gmt})
- This historical ratio would be multiplied by the appropriate Henry Hub gas futures price to determine projected prices. These historical ratios would be calculated for each prospective month (e.g. January 2009), based on data for that month over the past three years (e.g. January 2008, 2007 and 2006)

Calculating DAM Credit Requirements

- Step 1: Calculate the average DAM price divided by the final forward gas price at the Henry Hub for that time period to obtain a ratio

$$R_{hmz} = \sum \frac{P_{hmzt}}{P_{gmt}}$$

h: Hour

m: Month

z: Zone

t: Time

- Step 2: Apply the ratio to each unique combination of zone, month and time-of-day to create distinct credit requirements

DAM Example: Zone J

Average Day-Ahead Market Price

Zone J	2005	2006	2007
HB 7-10	137.63	57.97	70.56
HB 11-14	186.84	68.03	84.91
HB 15-18	195.97	66.80	90.39
HB 19-22	156.76	56.44	74.18
Night	94.18	35.28	42.42
Weekends/Holidays	126.06	53.05	66.77

Henry Hub Natural Gas Prices*

Date	Dollars Per Million BTU
08/29/2005	10.847
08/29/2006	6.816
08/29/2007	5.43

Henry Hub Gas Price Ratio

Zone J	2005	2006	2007	Average
HB 7-10	12.69	8.5	12.99	11.40
HB 11-14	17.22	9.98	15.64	14.28
HB 15-18	18.07	9.8	16.65	14.84
HB 19-22	14.45	8.28	13.66	12.13
Night	8.68	5.18	7.81	7.22
Weekends/Holidays	11.62	7.78	12.3	10.57

*Henry Hub gas futures prices come from the Bloomberg closing price of the NG1 contract three business days before the start of September of that year. Natural gas contracts expire three business days prior to the first calendar day of the delivery month.

DAM Example: September 2008

- The Henry Hub Ratio would be multiplied by the Henry Hub Gas Price for the relevant month to determine credit requirement
- September 2008 Henry Hub Gas Price published on August 29, 2008 was $8.40
- C = R * H
  - Where C = Credit Requirement, R = Henry Hub Gas Price Ratio, H = Currently published Henry Hub Gas Price

September 2008*

	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Zone H	Zone I	Zone J	Zone K
HB 7-10	72.40	75.40	76.56	77.79	80.02	82.82	86.25	87.20	87.40	95.66	95.60
HB 11-14	82.04	85.25	86.46	86.34	89.91	92.92	100.64	102.65	102.90	119.88	115.33
HB 15-18	81.74	84.68	86.09	85.81	89.46	92.64	103.24	106.09	106.45	124.55	123.75
HB 19-22	74.67	77.24	78.37	79.07	81.51	84.44	88.59	89.64	89.82	101.83	106.14
Night	47.79	49.64	50.69	52.17	52.93	55.24	56.11	56.46	56.63	60.64	67.99
Weekends/ Holidays	65.26	68.69	72.05	73.82	75.39	78.81	82.36	83.17	83.39	88.70	97.72

*Due to rounding conventions, some numbers displayed in the table may not match exactly the actual calculations using numbers on the previous page

Credit Requirements for TUC Charges

- DAM Transactions
  - *For each transaction the credit requirement will be calculated as:*
    - POW DAM Reference price – POI DAM Reference price
- Real Time Transactions
  - *For each transaction the credit requirement will be calculated as:*
    - (POW DAM Reference Price + POW Virtual Supply credit requirement) – (POW DAM Reference Price - POW Virtual Demand credit requirement)

Unbalanced Transactions

- Unbalanced transactions at a Trading Hub will have a credit requirement based on the energy imbalance
- DAM Transactions
  - *For each hour at a trading hub that is unbalanced, a credit requirement or offset will be calculated as: DAM Reference price x the unbalanced MWs at the trading Hub*
- Real Time Transactions
  - *For each hour at a trading hub that has insufficient energy the credit requirement will be calculated as: (DAM Reference price + Virtual Supply credit requirement) x the unbalanced MWs at the trading Hub*
  - *For each hour at a trading hub that has excess energy, a credit offset will be calculated as: (DAM Reference price - Virtual Demand credit requirement) x the unbalanced MWs at the trading Hub*

Real Time Credit Requirements

- Unbalanced RT Trading Hub transactions can have the same kind of price volatility risk as Virtual Transactions as both settle at real-time prices

- Therefore, unbalanced RT Trading Hub transactions will be subject to the same Virtual Transaction credit requirements approved by the Management Committee on October 29, 2008

Example: Real Time Credit Requirements

The same chart of price differentials for Virtual Supply as presented to MC on October 29,2008, conveys the structure of the Virtual Supply component of the credit requirement calculations

	Summer	Winter	Rest-of-Year
Zones A-F			
	On-Peak		
HB7-10	20.99	77.59	46.59
HB11-14	82.78	45.05	54.79
HB15-18	89.14	94.89	87.45
HB19-22	33.56	55.66	57.22
	Off-Peak		
Holiday	32.70	60.05	44.86
Night	30.49	41.45	38.46
Zones G-I			
	On-Peak		
HB7-10	22.94	81.96	54.66
HB11-14	203.50	57.91	63.99
HB15-18	428.13	98.35	97.83
HB19-22	46.14	62.41	65.51
	Off-Peak		
Holiday	42.58	67.76	64.02
Night	33.62	43.20	42.74
Zone J			
	On-Peak		
HB7-10	43.80	105.77	72.11
HB11-14	209.81	77.86	79.93
HB15-18	388.84	98.94	100.43
HB19-22	51.82	73.62	75.59
	Off-Peak		
Holiday	58.88	70.77	73.20
Night	41.39	47.21	46.75
Zone K			
	On-Peak		
HB7-10	56.24	111.27	75.22
HB11-14	311.38	101.59	90.07
HB15-18	439.58	144.77	126.41
HB19-22	151.47	109.04	97.10
	Off-Peak		
Holiday	97.88	94.66	76.10
Night	42.41	46.01	52.80

Example: Real Time Credit Requirements

The same chart of price differentials for Virtual Demand as presented to MC on October 29, 2008, conveys the structure of the Virtual Demand component of the credit requirement calculations

	Summer	Winter	Rest-of-Year
Zones A-F			
HB7-10	28.86	46.67	39.13
HB11-14	45.50	46.67	39.13
HB15-18	45.50	57.66	39.13
HB19-22	28.86	46.67	39.13
Holiday	33.84	46.67	39.13
Night	28.86	46.67	39.13
Zones G-I			
HB7-10	40.12	55.73	44.32
HB11-14	67.29	45.44	44.32
HB15-18	83.61	55.73	44.32
HB19-22	40.12	45.44	44.32
Holiday	40.12	45.44	44.32
Night	29.57	45.44	44.32
Zones J			
HB7-10	43.04	49.49	42.64
HB11-14	60.64	49.49	59.24
HB15-18	75.31	66.15	59.24
HB19-22	43.04	49.49	42.64
Holiday	43.04	49.49	42.64
Night	31.65	49.49	42.64
Zones K			
HB7-10	41.63	56.77	46.44
HB11-14	87.13	56.77	46.44
HB15-18	108.03	69.56	56.63
HB19-22	56.95	69.56	56.63
Holiday	58.30	56.77	56.63
Night	41.63	56.77	46.44

Processing Trading Hub Credit Requirements

- Any time a bilateral transaction is fully confirmed, updated or deleted, the following process will occur:
  - *Determine the net MW position for each hour and market at each of the Organization's Trading Hubs*
  - *Multiply each net MW position determined in the previous step with corresponding Credit Management System (CMS) reference values. The corresponding reference values are those which are effective during the same hour, market, and zone as the net MW position being evaluated*
  - *The results of the calculations in the previous step are summed together and added to the MPs overall energy market credit requirements*

Next Steps

- Complete overall assessment of current credit requirements for Energy and Ancillary Services as part of the evaluation and implementation of the CMS
- Determine any necessary adjustments to proposal for Trading Hub credit requirements based on the outcome of the Energy and Ancillary Services assessment
- Update MIWG as necessary

NEW YORK INDEPENDENT SYSTEM OPERATOR

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.

www.nyiso.com