

Load Serving Entity (LSE)

Energy Settlements

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Remote Learning

LSE Energy Settlements

Objectives Per Settlement:

- Provide Settlement Description
- Identify Settlement Eligibility
- Name Settlement Determinants
- Name Settlement Intermediates
- Explain Settlement Algorithm
- Step Through Settlement Scenario
- Perform Settlement Example
- Note Settlement Reference Material

LSE Energy Settlements

Settlement Name:

- Day Ahead Market (DAM) Energy
- Real Time Actual Load Calculation
- Balancing Market Energy

LSE Energy Settlements

LSE Day Ahead Market Energy

■ Settlement Description

- Intended to charge LSEs for DAM energy purchased via load schedules in the NYISO DAM
- DAM load schedules are NYCA purchases of energy by Market Participants (acting as LSEs) which are scheduled by NYISO in the DAM

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Eligibility

- LSE's load bus is scheduled to purchase energy in the NYISO DAM

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Determinants:

- DAM Energy Price: LSE (\$/MW)
- DAM Loss Price: LSE (\$/MW)
- DAM Congestion Price: LSE (\$/MW)
- Hr DAM Load Bid Fix Load (MW)
- Hr DAM Sched PrCap Load (MW)

LSE Energy Settlements

LSE Day Ahead Market Energy

- **Settlement Intermediates**
 - Hr DAM Sched Load (MW)
 - Hr DAM Energy Stlmnt: LSE(\$)
 - Hr DAM Loss Stlmnt: LSE(\$)
 - Hr DAM Cong Stlmnt: LSE(\$)

- **Settlement Results**
 - Hr Total DAM Stlmnt: LSE (\$)

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Algorithm:

Hr Total DAM Stlmnt: LSE (\$) = Hr DAM Energy Stlmnt: LSE(\$) +
Hr DAM Loss Stlmnt: LSE(\$) + Hr DAM Cong Stlmnt: LSE(\$)

Where:

Hr DAM Energy Stlmnt: LSE(\$) = [DAM Energy Price: LSE (\$/MW) * Hr
DAM Sched Load (MW)] * (-1)

Hr DAM Loss Stlmnt: LSE(\$) = [DAM Loss Price: LSE (\$/MW) * Hr
DAM Sched Load (MW)] * (-1)

Hr DAM Cong Stlmnt: LSE(\$) = [{(-1) * DAM Congestion Price: LSE
(\$/MW)} * Hr DAM Sched Load (MW)] * (-1)

And:

Hr DAM Sched Load (MW) = Hr DAM Load Bid Fix Load (MW) + Hr
DAM Sched PrCap Load (MW)

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement scenario:

- ‘LSE ABC’ entered the following bids for HB 13:
 - 50 MWs of Fixed Load = Hr DAM Load Bid Fix Load (MW)
 - 100 MWs of Price Capped Load Bid was scheduled = Hr DAM Sched PrCap Load (MW)
- LBMP Cost Components for HB 13
 - Hr DAM Energy price: \$58.00 /MWh
 - Hr DAM Loss price: \$5.00 /MWh
 - Hr DAM Cong price: \$-7.00 /MWh

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Example:

1. Calculate Hr DAM Sched Load (MW)
2. Calculate Hr Total DAM Stlmnt: LSE (\$)

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Summary:

- LSEs charged for withdrawing power from NYISO
- Charges based on:
 - Accepted DAM Schedule
 - DAM LBMP

LSE Energy Settlements

LSE Day Ahead Market Energy

Settlement Reference Material:

- **Tariff Reference**
 - Market Services Tariff (MST) - Section 4.2.6
- **Accounting and Billing Manual**
 - Section 6.1.1, Appendix J
- **Advisory Billing File**
 - LSE LBMP Energy Section
 - Hr Total DAM Stmt: LSE (\$)
 - Day Total DAM Stmt: LSE (\$)
 - Hourly Bill Codes: 404-406
 - Daily Bill Code: 701-703
- **DSS Corporate Report**
 - Settlement Details – Load Serving Entity – Day Ahead Market Energy

LSE Energy Settlements

Settlement Name:

- Day Ahead Market (DAM) Energy
- **Real Time Actual Load Calculation**
- Balancing Market Energy

LSE Energy Settlements

Energy used for Balancing Market (MW)

- NYISO does not meter load in real-time
- For an initial invoice, NYISO uses an estimation process to determine LSE withdrawals
- Instantaneous sub-zonal load allocated to each LSE within each sub-zone
 - *Based on ratio of LSE's hourly bus forecasts to the total sub-zonal hourly forecast [sum of Bus Forecasts]*
 - *LSE may update bus forecast for the preceding day by noon the next day*
- Process in place to adjust estimated values to revenue quality metered values once received from the Transmission Owner

LSE Energy Settlements

Energy used for Balancing Market (MW)

11 NYCA Zones

Each zone divided into Subzones

- Subzone: Transmission District served by the utility
- One utility per Subzone

Load within each Subzone served by multiple LSEs

LSEs comprised of aggregation of Retail Access Customers

Load Bus

LSE Energy Settlements

Calculation of Real Time Actual Load for Balancing Market (MW)

- Settlement Determinants
 - *Hr DAM Load Bid Frcst Load (MW)*
 - *Hr DAM Subzone Forecast Load (MW)*
 - *SCD Total Subzone Load (MW)*
 - *Hr DAM Scheduled Load (MW)*
 - *RTD Adj for Unaccounted Energy Ind ('Y'/'N')*
- Settlement Intermediates
 - *SCD RT Actual Load: LSE (MW)*
- Results
 - *SCD BalMkt Load: LSE (MW)*

LSE Energy Settlements

Calculation of Real Time Actual Load for Balancing Market (MW)

- Settlement Algorithm

$$\text{SCD BalMkt Load: LSE (MW)} = \text{SCD RT Actual Load: LSE (MW)} - (\text{Hr DAM Scheduled Load (MW)} + \text{RT Sched Trans (MW)})$$

Where:

$$\text{SCD RT Actual Load: LSE (MW)} = \{(\text{Hr DAM Load Bid Frct Load (MW)} / \text{Hr DAM Subzone Forecast Load (MW)}) * \text{SCD Total Subzone Load (MW)}\}$$

And:

$$\text{Hr DAM Sched Load (MW)} = \text{Hr DAM Load Bid Fix Load (MW)} + \text{Hr DAM Sched PrCap Load (MW)}$$

LSE Energy Settlements

Calculation of Real Time Actual Load for Balancing

Market (MW)

DSS Custom Report - LSE Bal Mkt MW and MWh

Interval Start Date/Time (Eastern)	Interval Start Hour (Eastern)	SCD Total BalMkt Stlmnt - LSE (\$)	SCD BalMkt Energy Stlmnt - LSE (\$)	SCD BalMkt Loss Stlmnt - LSE (\$)	SCD BalMkt Cong Stlmnt - LSE (\$)	SCD RT Energy Price - LSE (\$/MWh)	SCD RT Loss Price - LSE (\$/MWh)	SCD RT Cong Price - LSE (\$/MWh)	Hr DAM Load Bid Frcst (MW)	Hr DAM Subzone Frcst (MW)	Hr DAM Sched Load (MW)	SCD RT Actual Load (MW)	SCD RT Sched Trans Load Bus (MW)	SCD Total Subzone Load (MW)	SCD BalMkt Load - LSE (MW)	SCD RT Sched Trans (MWh) - Load Bus	SCD RT Actual Load (MWh)	SCD Total Subzone Load (MWh)	SCD BalMkt Load - LSE (MWh)	SCD Adj for Unaccou nted Energy	SCD Interval Seconds	Bal Mkt Stlmnt	
10/08/xxxx	12:00:00 AM	00	-43.44	-40.47	-2.96	0.00	15.70	1.15	0.00	318.0000	942.0	318.0000	348.9		1,033.6	30.9	0.0000	29.0779	86.1304	2,577.9	Y	300	\$40.47
10/08/xxxx	12:05:00 AM		-40.97	-38.18	-2.78	0.00	15.65	1.14	0.00	318.0000	942.0	318.0000	347.3		1,028.7	29.3	0.0000	28.9399	85.7216	2,439.9	Y	300	\$2.96
10/08/xxxx	12:10:00 AM		-37.96	-35.35	-2.61	0.00	15.56	1.15	0.00	318.0000	942.0	318.0000	345.3		1,022.7	27.3	0.0000	28.7717	85.2235	2,271.7	Y	300	\$0.00
10/08/xxxx	12:15:00 AM		-27.10	-25.23	-1.87	0.00	12.42	0.92	0.00	318.0000	942.0	318.0000	342.4		1,014.1	24.4	0.0000	28.5316	84.5122	2,031.6	Y	300	\$43.44
10/08/xxxx	12:20:00 AM		-25.36	-23.62	-1.74	0.00	12.35	0.91	0.00	318.0000	942.0	318.0000	341.0		1,009.9	23.0	0.0000	28.4128	84.1603	1,912.8	Y	300	
10/08/xxxx	12:25:00 AM		-23.38	-21.75	-1.62	0.00	12.33	0.92	0.00	318.0000	942.0	318.0000	339.2		1,004.6	21.2	0.0000	28.2642	83.7201	1,764.2	Y	300	
10/08/xxxx	12:30:00 AM		-22.01	-20.52	-1.50	0.00	12.35	0.90	0.00	318.0000	942.0	318.0000	337.9		1,001.0	19.9	0.0000	28.1615	83.4159	1,661.5	Y	300	
10/08/xxxx	12:35:00 AM		-21.74	-20.24	-1.50	0.00	11.32	0.84	0.00	318.0000	942.0	318.0000	339.5		1,005.5	21.5	0.0000	28.2880	83.7905	1,788.0	Y	300	
10/08/xxxx	12:40:00 AM		-31.52	-29.38	-2.14	0.00	15.10	1.10	0.00	318.0000	942.0	318.0000	341.3		1,011.1	23.3	0.0000	28.4458	84.2580	1,945.8	Y	300	
10/08/xxxx	12:45:00 AM		-18.63	-17.35	-1.28	0.00	12.43	0.92	0.00	318.0000	942.0	318.0000	334.7		991.5	16.7	0.0000	27.8954	82.6279	1,395.4	Y	300	
10/08/xxxx	12:50:00 AM		-18.76	-17.46	-1.30	0.00	12.36	0.92	0.00	318.0000	942.0	318.0000	335.0		992.2	17.0	0.0000	27.9129	82.6795	1,412.9	Y	300	
10/08/xxxx	12:55:00 AM		-16.42	-15.29	-1.12	0.00	12.42	0.91	0.00	318.0000	942.0	318.0000	332.8		985.7	14.8	0.0000	27.7315	82.1421	1,231.5	Y	300	
		00													269.2			340.4332	1,008.3821	22.4332			

Also known as 'Total Load' in DSS Corporate Report	$SCD RT Actual Load = (Hr DAM Load Bid Forecast Load (MW) / Hr DAM Subzone Forecast Load (MW)) \times SCD Total Subzone Load$	348.9105
Also known as 'BalMkt Load (MW)' in DSS Corporate Report	$SCD BalMkt Load: LSE (MW) = SCD RT Actual Load - (DAM Scheduled Load + RT Sched Trans (MW))$	30.9350
Also known as 'BalMkt Load (MWh)' in DSS Corporate Report	$SCD BalMkt Load: LSE (MWh) = [SCD BalMkt Load (MW)] \times (Seconds in Interval / 3600)$	2.58

- DSS CUSTOM Report Naming Convention**
- ◆ **Hr DAM Load Bid Forecast Load (MW)**
 - ◆ **Hr DAM Subzone Forecast Load (MW)**
 - ◆ **SCD Total Subzone Load (MW)**
 - ◆ **Hr DAM Scheduled Load (MW)**
 - ◆ **SCD RT Actual Load (MW)**
 - ◆ **SCD BalMkt Load: LSE (MW)**
 - ◆ **SCD BalMkt Load: LSE (MWh)**

- DSS CORPORATE Report Naming Convention**
- ◆ **DAM Load Bid Forecast Load (MW)**
 - ◆ **DAM Subzone Forecast Load (MW)**
 - ◆ **Total Subzone Load (MW)**
 - ◆ **DAM Scheduled Load (MW)**
 - ◆ **Total Load (MW)**
 - ◆ **BalMkt Load (MW)** – not visible in DSS Corporate Report
 - ◆ **BalMkt Load (MWh)**

LSE Energy Settlements

Calculation of Real Time Actual Load for Balancing Market (MW)

Settlement Reference Material:

- **Tariff Reference**
 - OATT - Sections 2.7.4.3.1 and 2.7.4.4.1
 - MST - Sections 7.4.2.1 and 7.4.3.1
- **Accounting and Billing Manual**
 - Section 3.2.2.1
- **Advisory Billing File**
 - N/A
- **DSS Corporate Report**
 - Settlement Details – Load Serving Entity – Balancing Energy
- **Market Information System (MIS)**
 - Metering Loads
 - Metering Reconciliation
 - Metering Ties
 - Wholesale Load Bus Details

LSE Energy Settlements

Settlement Name:

- Day Ahead Market (DAM) Energy
- Real Time Actual Load Calculation
- **Balancing Market Energy**

LSE Energy Settlements

Balancing Market Energy

Settlement Description:

- Addresses variations from the Day Ahead Market
- Intended to charge or credit Market Participants (acting as Load Serving Entities) for energy purchased or sold in the NYISO Balancing Energy Market

LSE Energy Settlements

Balancing Market Energy

Settlement Eligibility:

- LSE will be charged for Balancing Market Energy if:
 - LSE load bus actual energy withdrawals exceed scheduled withdrawals over an RTD interval.
- LSE will be credited for Balancing Market Energy if:
 - LSE load bus actual energy withdrawals are less than scheduled withdrawals over an RTD interval.

LSE Energy Settlements

Balancing Market Energy

- **Settlement Determinants**
 - Hr DAM Sched Load (MW)
 - RTD RT Sched Trans (MW): Load Bus
 - SCD/RTD RT Actual Load (MW)
 - RTD Energy Price: (\$/MWh)
 - RTD RT Loss Price: (\$/MWh)
 - RTD RT Cong Price: (\$/MWh)
 - RTD Interval Seconds

LSE Energy Settlements

Balancing Market Energy

- **Settlement Intermediates**
 - SCD BalMkt Load: LSE (MW)
 - **SCD/RTD BalMkt Load: LSE (MWh)**
 - RTD BalMkt Energy Stlmnt(\$)
 - RTD BalMkt Losses Stlmnt (\$)
 - RTD BalMkt Congestion Stlmnt (\$)

- **Settlement Results**
 - RTD Total BalMkt Stlmnt (\$)

LSE Energy Settlements

Balancing Market Energy

Settlement Algorithm:

RTD BalMkt Total Stlmnt (\$) = RTD BalMkt Energy Stlmnt (\$) + RTD BalMkt Loss Stlmnt (\$) + RTD BalMkt Cong Stlmnt (\$)

Where:

RTD BalMkt Energy Stlmnt (\$) = [RTD RT Energy Price: LSE (\$/MWh) * RTD BalMkt Load: LSE (MWh)] * (-1)

RTD BalMkt Loss Stlmnt (\$) = [RTD RT Loss Price: LSE (\$/MWh) * RTD BalMkt Load: LSE (MWh)] * (-1)

RTD BalMkt Cong Stlmnt (\$) = [(-1) * RTD RT Cong Price: LSE (\$/MWh)] * RTD BalMkt Load: LSE (MWh) * (-1)

And:

RTD BalMkt Load: LSE (MWh) = SCD BalMkt Load: LSE (MW) * (RTD Interval Seconds / 3600)

And:

SCD BalMkt Load: LSE (MW) = RTD RT Actual Load (MW) - {Hr DAM Sched Load (MW) + RTD RT Sched Trans (MW): Load Bus}

LSE Energy Settlements

Balancing Market Energy

Settlement Scenario

- Determine Balancing Energy settlement for a 300 second interval using the following data recorded for the interval:
 - Hr DAM Sched Load (MW) = 150 MW (calc from Slide #10)
 - RTD RT Sched Trans (MW): Load Bus = 5 MW
 - RTD RT Actual Load (MW) Bus_1 = 171 MW
 - RTD RT Energy Price (\$/MWh) = \$ 30.00/MWh
 - RTD RT Loss Price (\$/MWh) = \$ 2.00/MWh
 - RTD RT Cong Price (\$/MWh) = \$ -3.00/MWh

LSE Energy Settlements

Balancing Market Energy

Settlement Example:

1. Calculate **SCD/RTD BalMkt Load: LSE (MWh)**
*Hint: Calculate **SCD BalMkt Load: LSE (MW)** first*
2. Calculate **RTD Total BalMkt Stlmnt - LSE (\$)**

Settlement Summary for this Load Bus

- **Hr Total DAM Stlmnt: LSE (\$) = \$ - 10,500 [one hour]**
 - Hr DAM Sched Load (MW) = 150 MW

- **RTD Total BalMkt Stlmnt - LSE (\$) \$ - 46.65 [one interval]**
 - RTD RT Actual Load (MW) Bus_1 = 171 MW
 - RTD RT Sched Trans (MW): Load Bus = 5 MW
 - SCD/RTD BalMkt Load: LSE (MWh) = $171 - (150+5) * (300/3600)$
 - $16 \text{ MW} * 0.0833 = 1.3328 \text{ MWh}$

LSE Energy Settlements

Balancing Market Energy

Settlement Reference Material:

- **Tariff Reference**
 - Market Services Tariff (MST) - Section 4.5

- **Accounting and Billing Manual**
 - Section 6.1.2, Appendix J

- **Advisory Billing File**
 - LSE LBMP Energy Section
 - *Hr Total BalMkt Stlmnt: LSE (\$)*
 - *Daily Total BalMkt Stlmnt: LSE (\$)*
 - Hourly Bill Codes: 407, 409-411
 - Daily Bill Code: 704-707

- **DSS Corporate Report**
 - Settlement Details – Load Serving Entity – Balancing Energy