

# Uplift and Virtual Trading

*Billing and Accounting Working Group  
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NYISO

NYISO - For Discussion Only

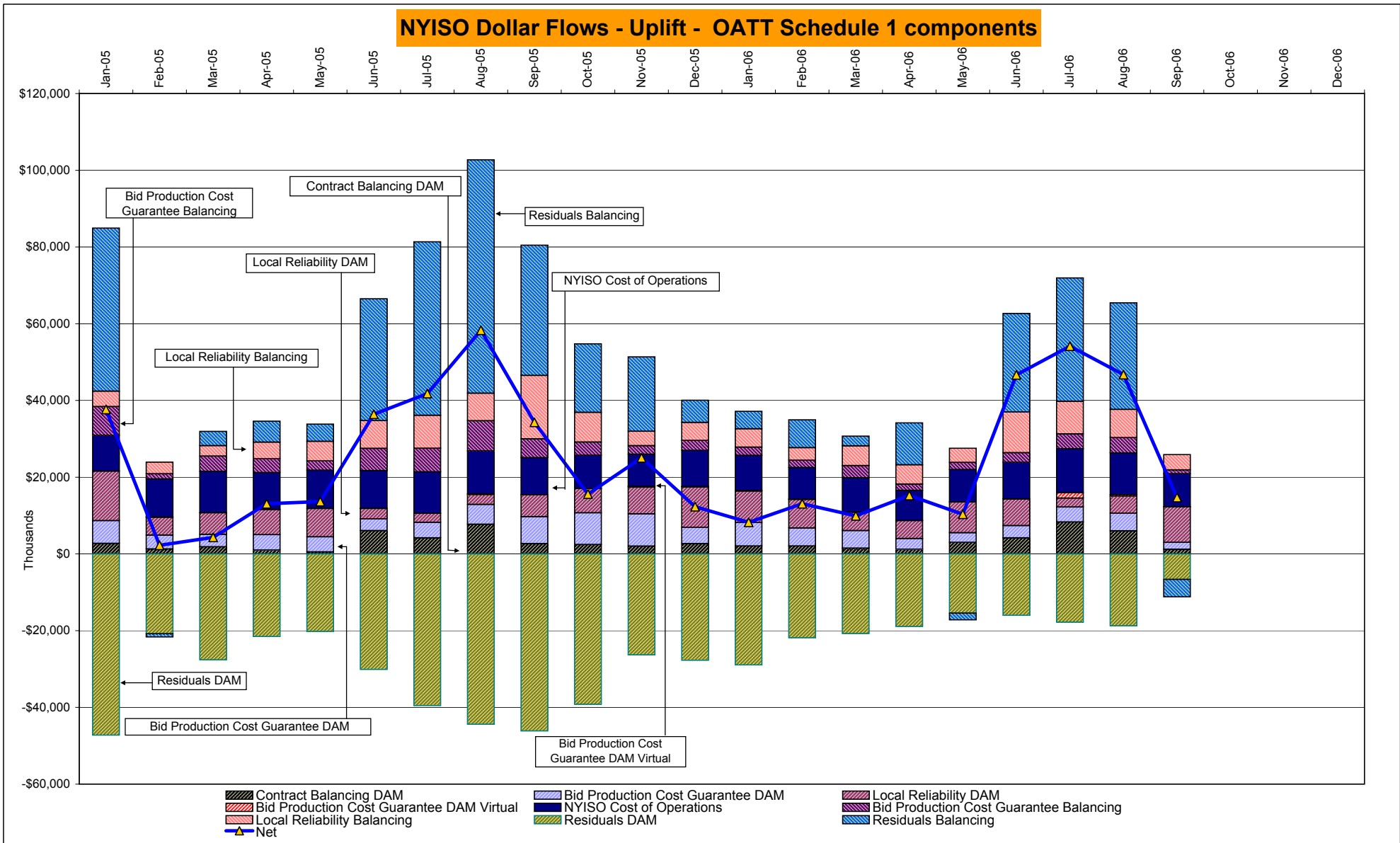
# Agenda

- Uplift Trends and Drivers
  - Uplift Categories
  - DAM and Balancing Market Uplift
  - “Make Whole” vs Residuals
  - Summer 2006
- Virtual Trading and the Markets
  - Virtual Trading Highlights and Rationale
  - Virtual Trading Rules
  - Virtual Trading and the Day Ahead Dispatch
  - Uplift Allocation

# Part 1- Uplift Trends and Drivers

# Schedule 1 Components by Market

Day Ahead Market  
Balancing Market



DAM Contract Balancing amounts are for payments made to generating units to make them whole for being dispatched below their Day-Ahead schedule, as a result of out-of-merit dispatches.  
 DAM Bid Production Cost Guarantees for Virtual Transactions are included in the chart and are shown from the inception of Virtual Transactions. These values are small and cannot be identified on the chart.  
 DAM residuals are revenue charged or returned to customers due to the under or over collection of funds.

# OATT Schedule 1 Components

- Bid Production Cost Guarantee Balancing
- Bid Production Cost Guarantee DAM
- Bid Production Cost Guarantee DAM Virtual
- DAM Contract Balancing
- Local Reliability Balancing
- Local Reliability DAM
- NYISO Cost of Operations
- Residuals Balancing
- Residuals DAM

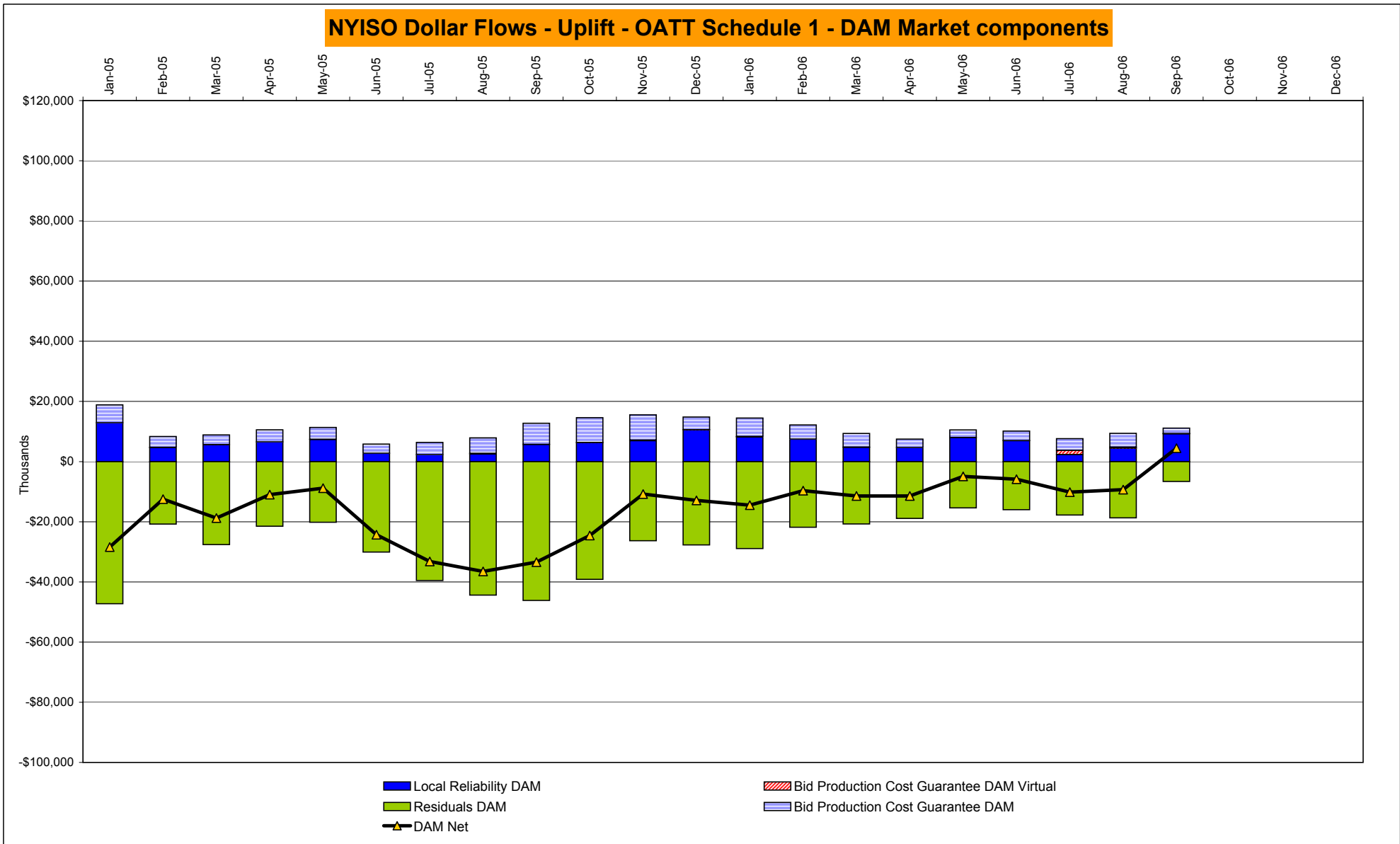
**Billing Codes for Chart 4-C**

<b>Chart 4-C Category Name</b>	<b>Billing Code</b>	<b>Billing Category Name</b>
Bid Production Cost Guarantee Balancing	81203	Balancing NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee Balancing	81204	Balancing NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee Balancing	81205	Balancing NYISO Bid Production Cost Guarantee Expenditure due to Curtailed Imports
Bid Production Cost Guarantee Balancing	81208	Balancing NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee Balancing	81209	Balancing NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee Balancing	81213	Balancing NYISO Bid Production Cost Guarantee Expenditure due to Curtailed Imports
Bid Production Cost Guarantee DAM	81201	DAM NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee DAM	81202	DAM NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee DAM	81206	DAM NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee DAM	81207	DAM NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee DAM Virtual	81501	DAM Virtual Bid Production Cost Guarantee
DAM Contract Balancing	81315	DAM Contract Balancing
DAM Contract Balancing	81317	DAM Contract Balancing
Local Reliability Balancing	81002	Balancing Local Reliability Bid Production Cost Guarantee
Local Reliability DAM	81001	DAM Local Reliability Bid Production Cost Guarantee
NYISO Cost of Operations	80901	NYISO Cost Of Operations
NYISO Cost of Operations	80902	NYISO Cost Of Operations
NYISO Cost of Operations	83501	NYISO Cost Of Operations
NYISO Cost of Operations	83502	NYISO Cost Of Operations
Residuals Balancing	81302	Balancing Market Energy Residual
Residuals Balancing	81304	Balancing Market Loss Residual
Residuals Balancing	81305	Balancing Market Congestion Balancing
Residuals Balancing	81306	Emergency Energy Purchases
Residuals Balancing	81307	Emergency Energy Sales
Residuals Balancing	81309	Balancing Market Energy Residual
Residuals Balancing	81311	Balancing Market Loss Residual
Residuals Balancing	81312	Balancing Market Congestion Balancing
Residuals Balancing	81313	Emergency Energy Purchases
Residuals Balancing	81314	Emergency Energy Sales
Residuals DAM	81301	Day Ahead Market Energy Residual
Residuals DAM	81303	Day Ahead Market Loss Residual
Residuals DAM	81308	Day Ahead Market Energy Residual
Residuals DAM	81310	Day Ahead Market Loss Residual

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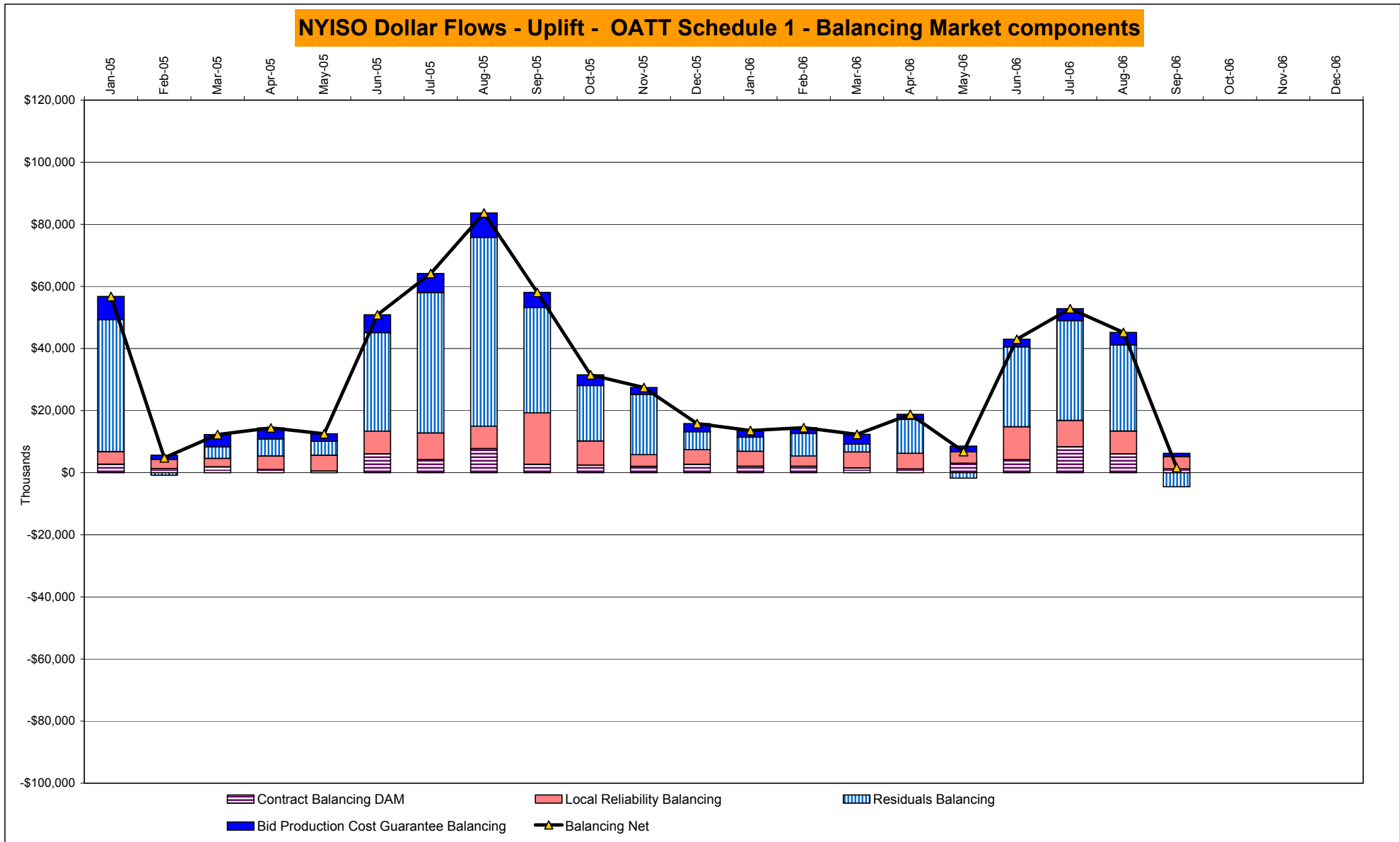




DAM Bid Production Cost Guarantees for Virtual Transactions are included in the chart and are shown from the inception of Virtual Transactions. These values are small and cannot be identified on the chart. DAM residuals are revenue charged or returned to customers due to the under or over collection of funds.

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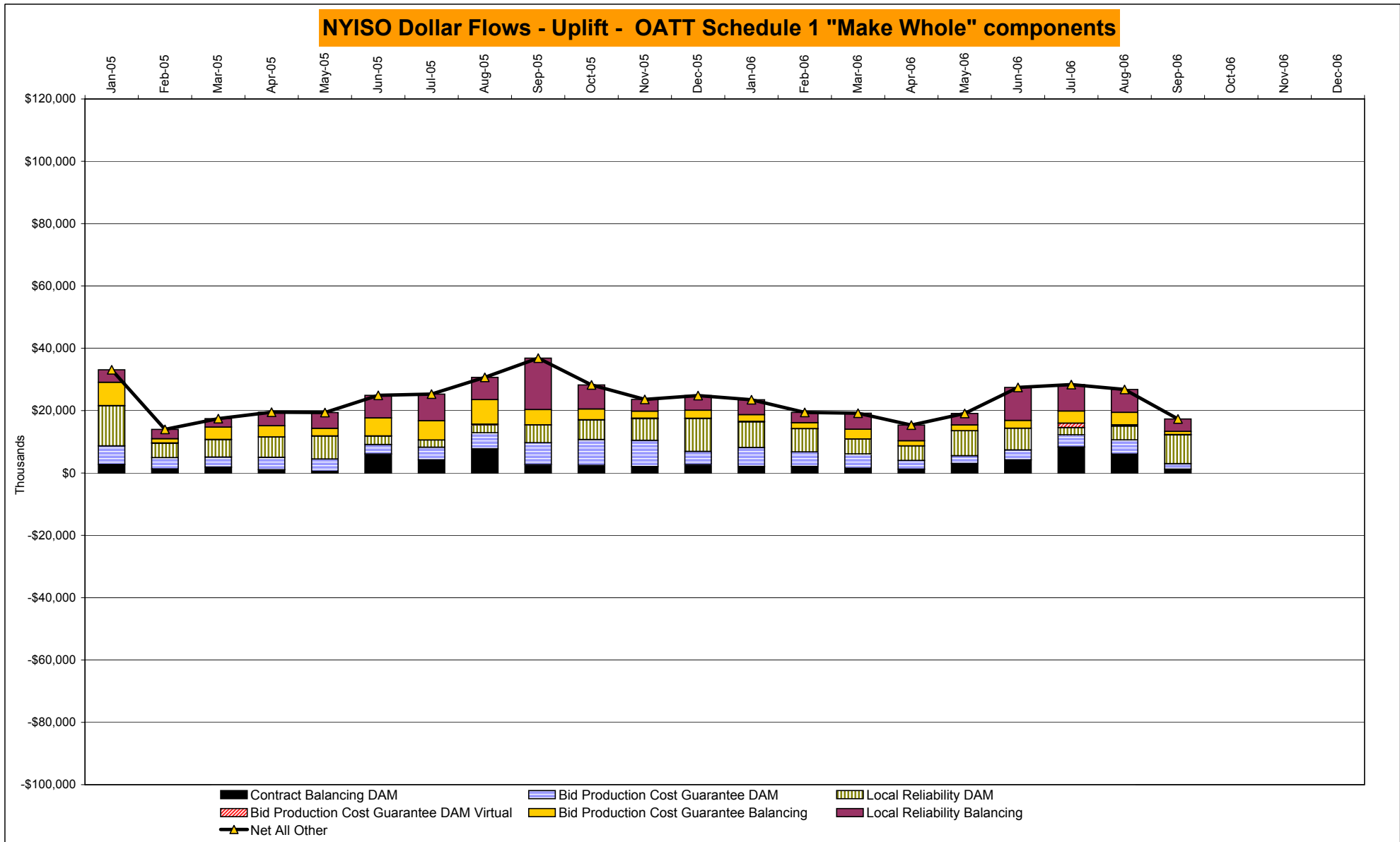
DAM Contract Balancing amounts are for payments made to generating units to make them whole for being dispatched below their Day-Ahead schedule, as a result of out-of-merit dispatches.

# Schedule 1 Components by Type

“Make whole” uplift  
Residuals

# OATT Schedule 1 Components

- Bid Production Cost Guarantee Balancing
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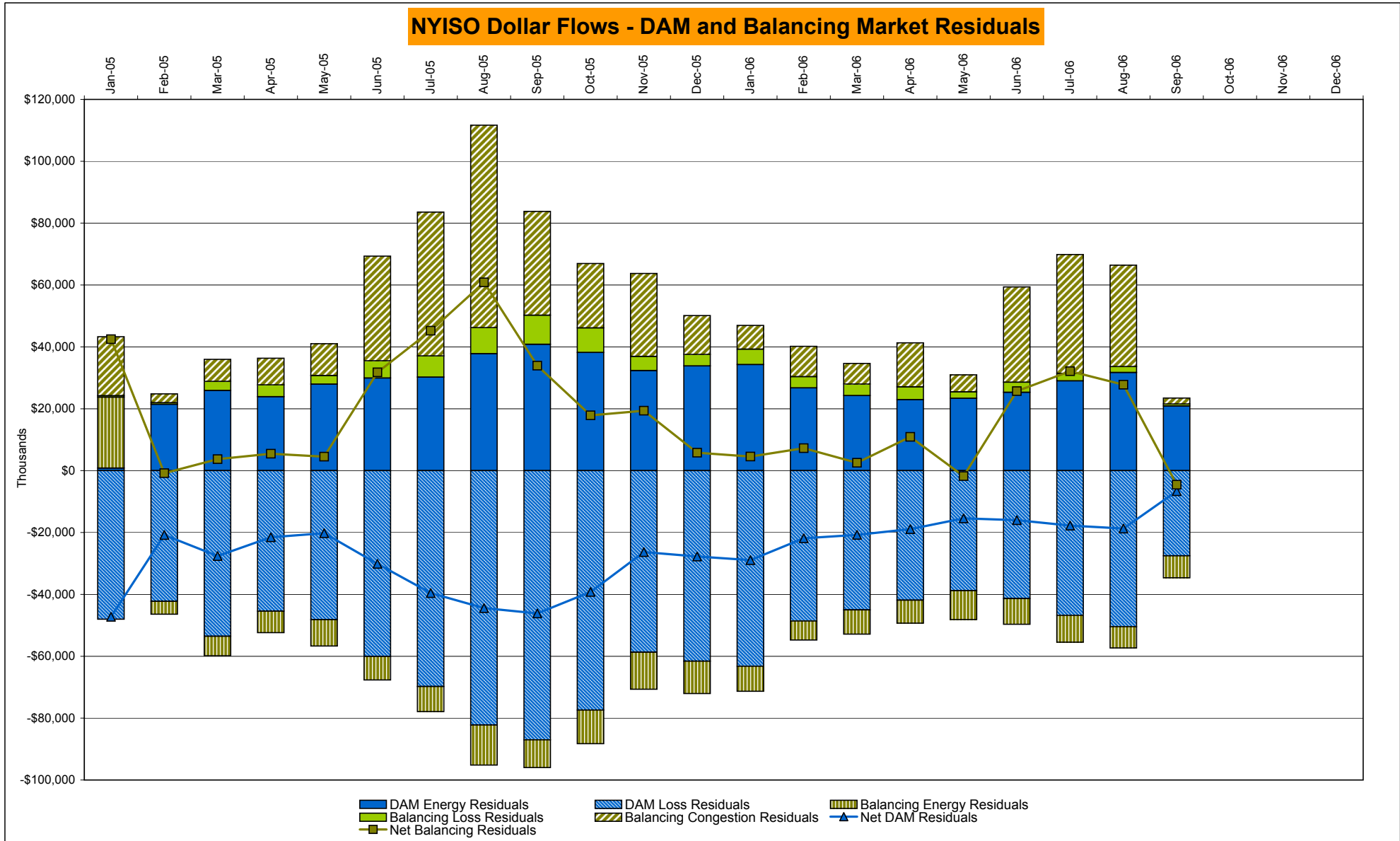
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- Residuals DAM
  - DAM Energy Residuals
  - DAM Loss Residuals





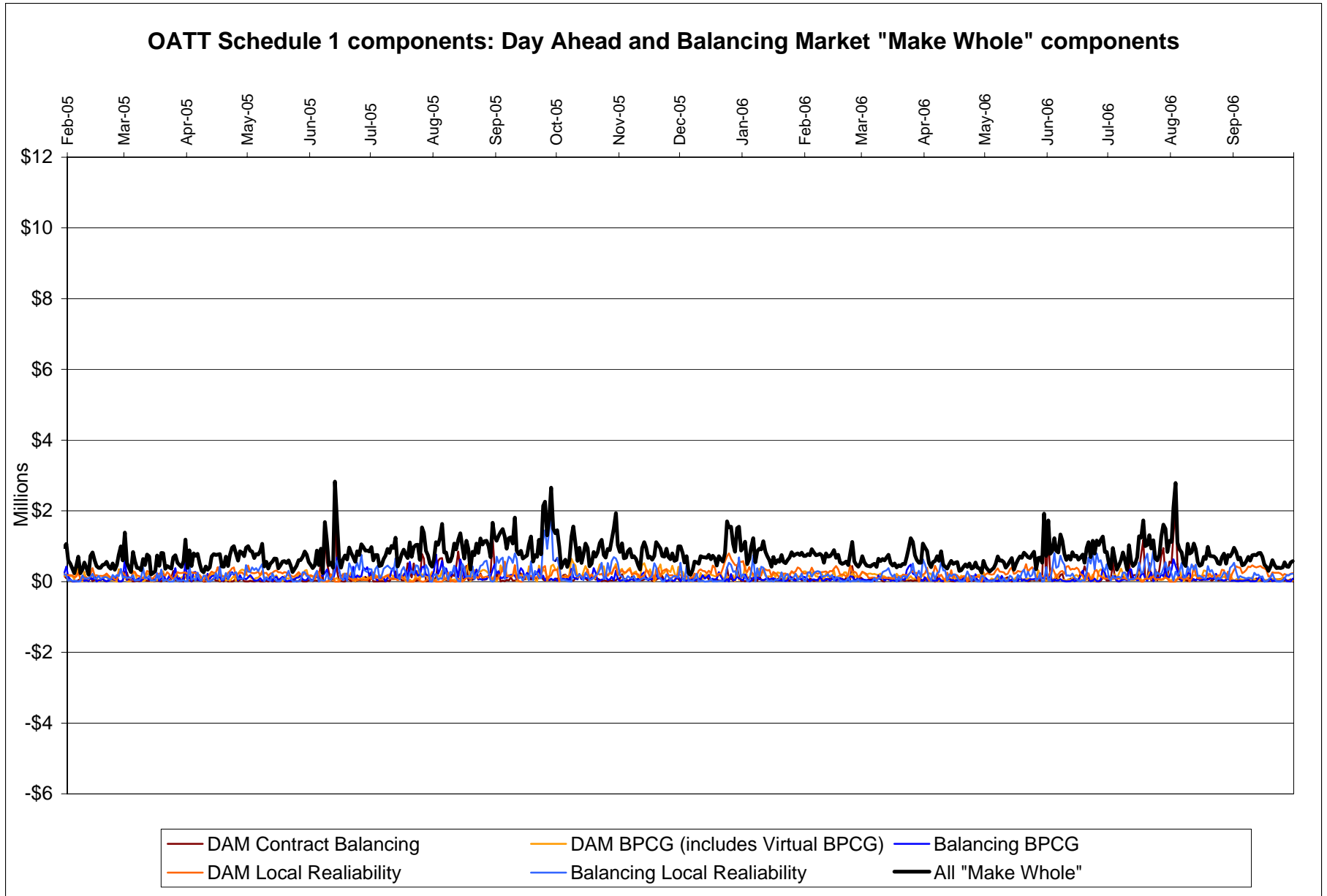
DAM residuals are revenue charged or returned to customers due to the under or over collection of funds.

# Schedule 1 Components – Daily numbers

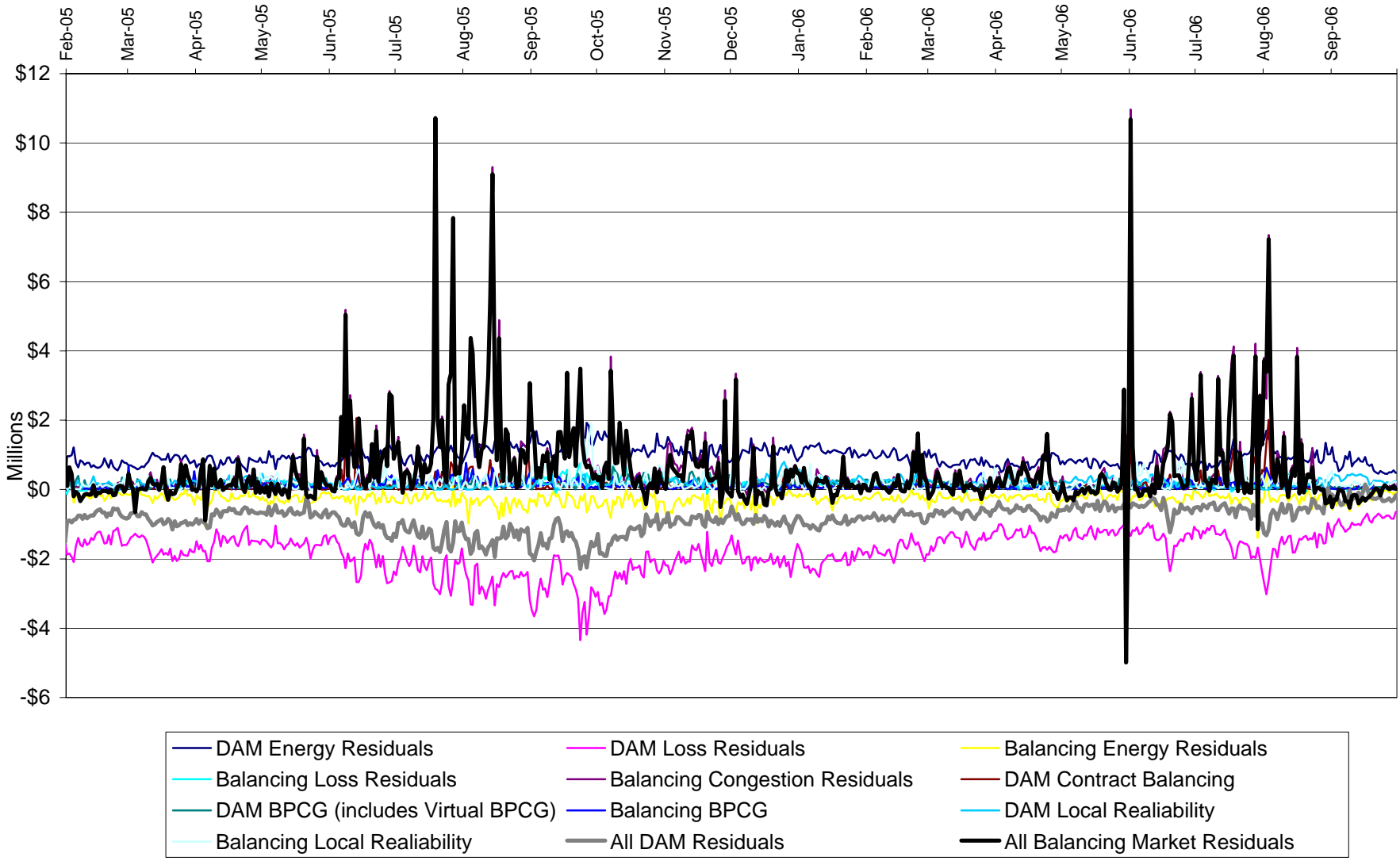
June 1 and Summer Variability

# Daily Schedule 1 Components by Type

“Make whole” uplift  
Residuals

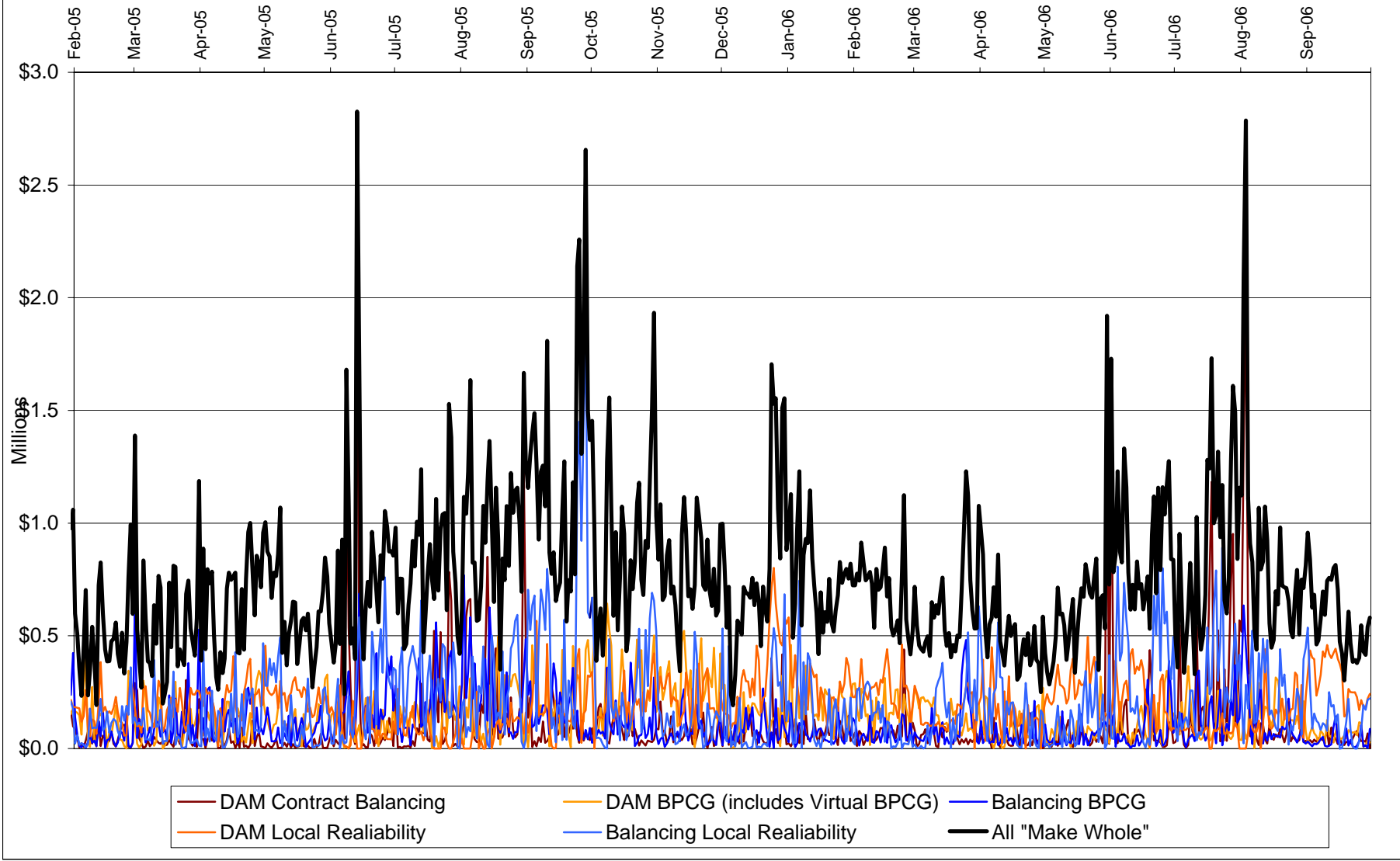


### OATT Schedule 1 Components: Day Ahead and Balancing Market Residuals



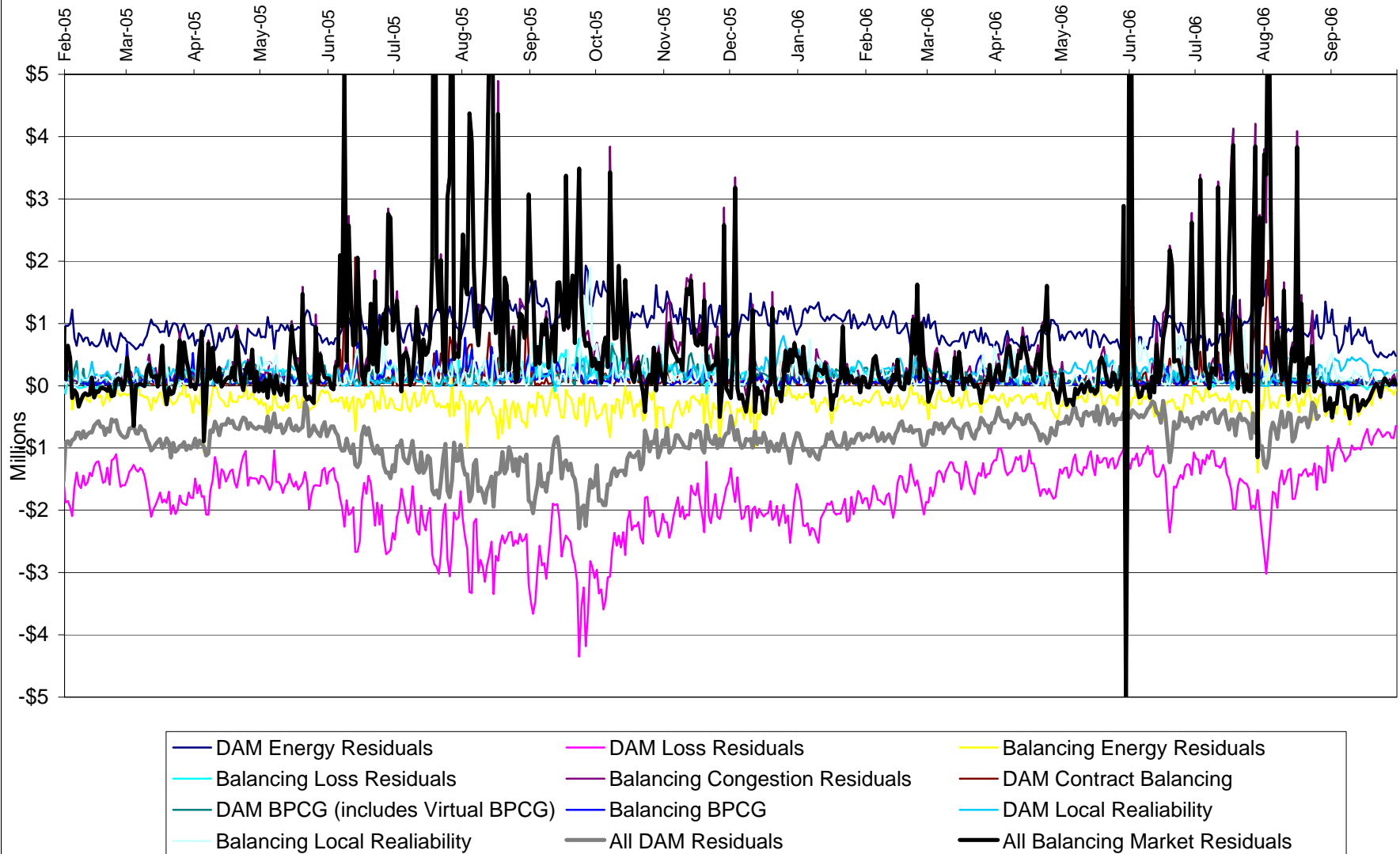
**Detail**

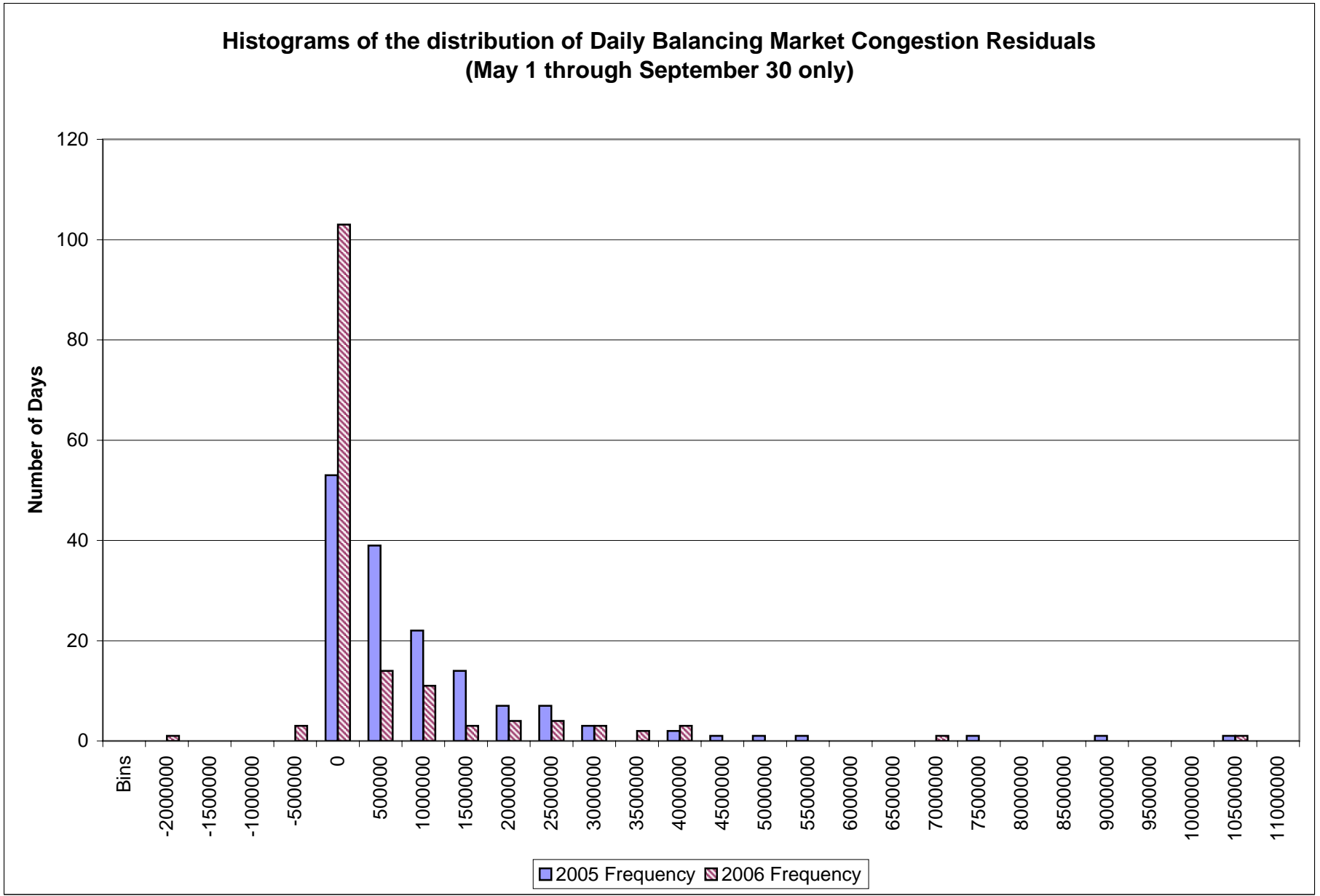
**OATT Schedule 1 components: Day Ahead and Balancing Market "Make Whole" components**



Detail

### OATT Schedule 1 Components: Day Ahead and Balancing Market Residuals







## Balancing Market Congestion Residual- Daily Stats

	2005	2005 May-Sept	2006 May-Sept
Mean	\$ 787,862	\$ 1,239,281	\$ 715,198
Median	\$ 455,526	\$ 753,341	\$ 190,410
St. Dev.	\$ 1,144,459	\$ 1,535,126	\$ 1,393,772
Min	-\$ 152,097	\$ 6,520	-\$ 1,659,103
Max	\$10,677,676	\$10,677,676	\$10,967,888

# Part 2 – Virtual Trading and the DAM and Balancing Markets

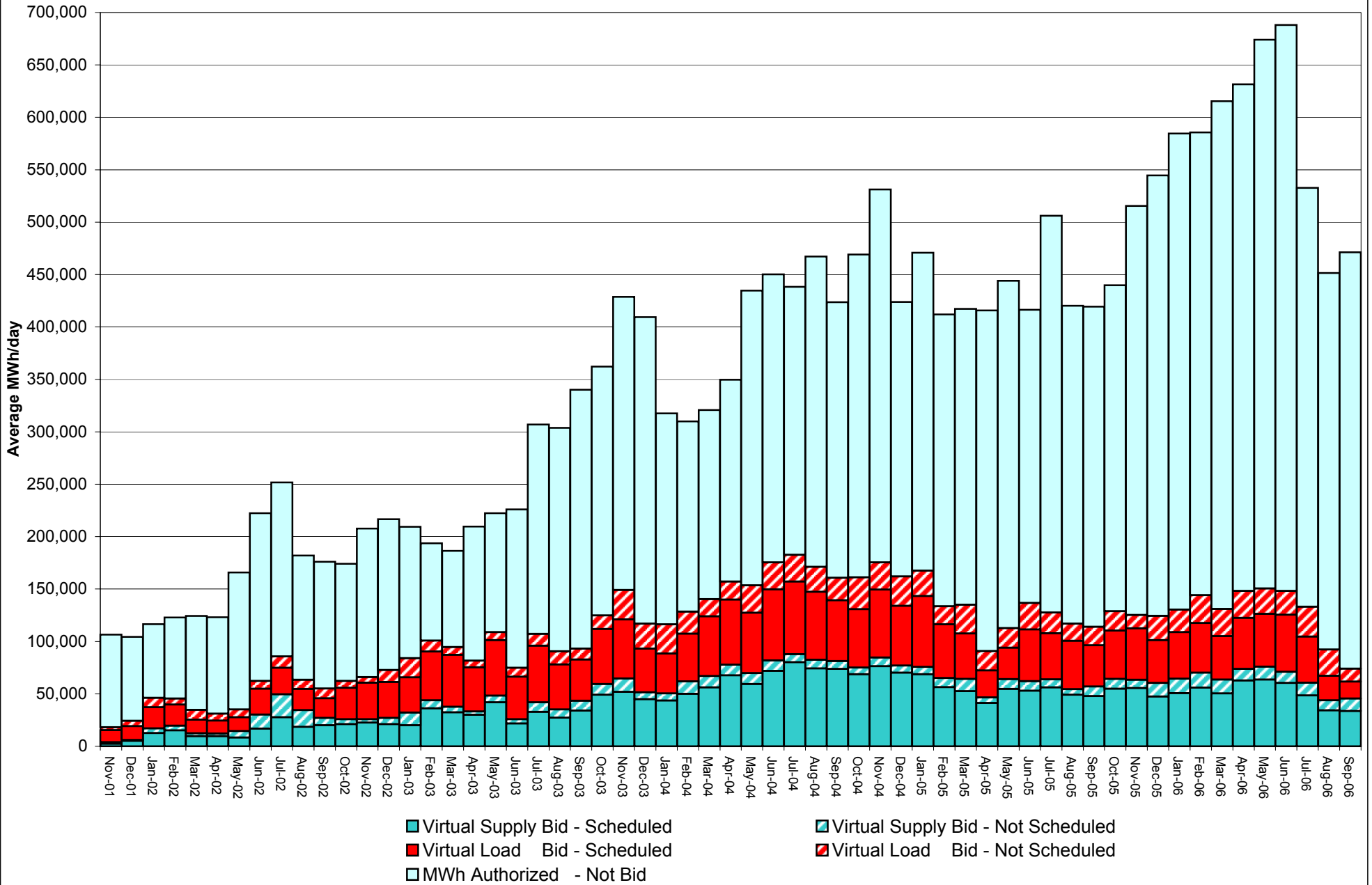
# Highlights

- New York electricity markets went live in December 1999
- Day-Ahead and Real-Time market for energy, reserve, and regulation.
  - Three reserve locations
  - Three reserve types (Spinning, 10 minute non-sync, 30-minute)
- Transmission Congestion Contract (TCC) and Capacity markets
- Virtual Bidding was introduced in November 2001 after many months of spirited discussions with market participants.

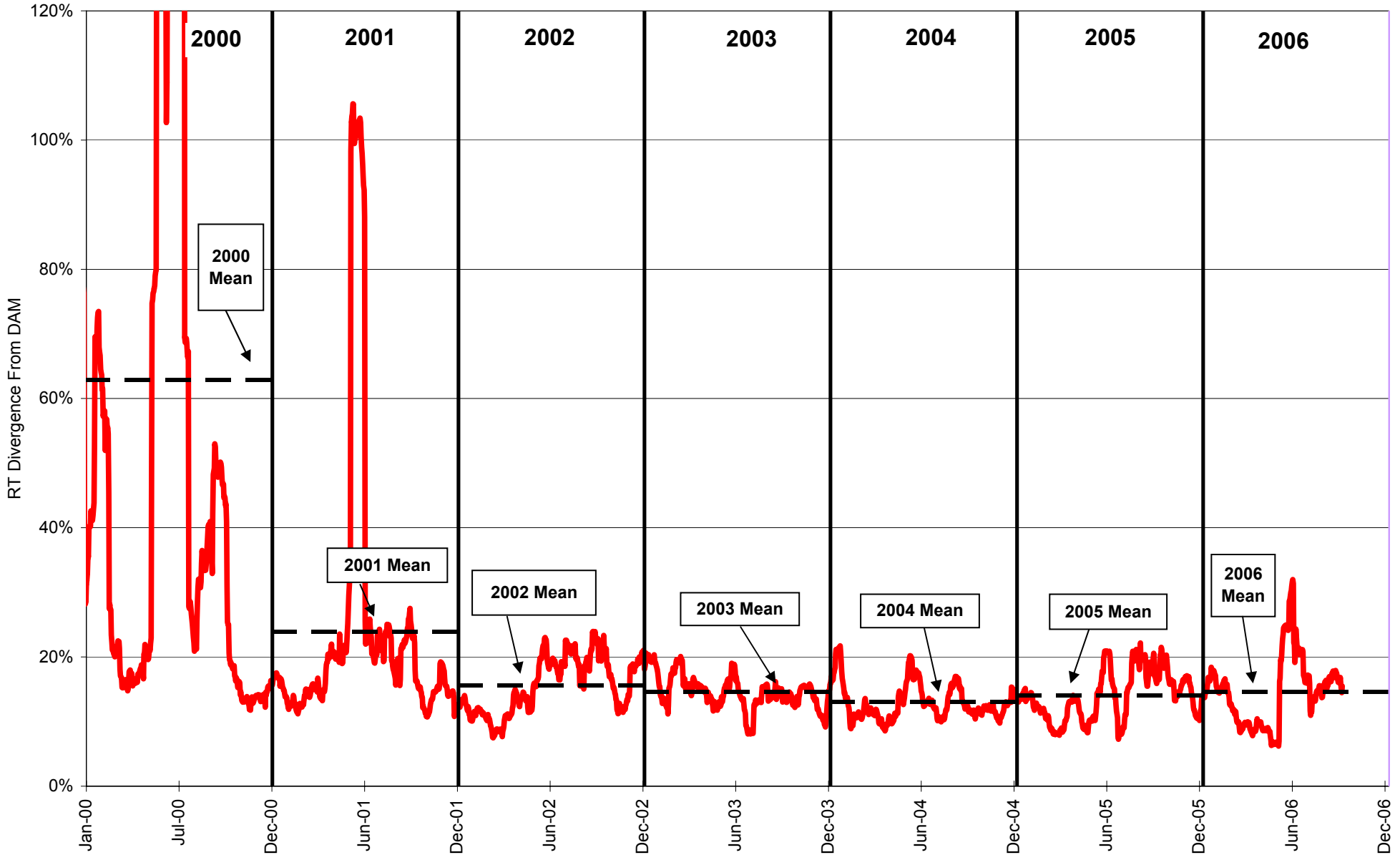
# Virtual Trading – Rationale

- Virtual trading is the arbitrage of day-ahead to real-time energy price differences.
  - Virtual Load: Virtual energy purchases are sold back in real-time by the virtual trader.
  - Virtual Supply: Virtual energy sales are bought back in real-time by the virtual trader.
- Allows physical load/generation to hedge positions between the day-ahead and real-time.
- Converges Day-Ahead and Real-Time energy prices.
- Provides a better Day-Ahead commitment.
- Increases liquidity because more participants are in the day-ahead energy market.
- Provides more degrees of freedom in identifying solutions to security-constrained unit commitment and dispatch problems which, enables the NYISO to more easily arrive at a solution and leads to a more efficient solution.

### NYISO Virtual Trading Average MWh per day



**NYISO Price Convergence  
DAM and Real Time LBMP  
NYCA Wide (Through 9/30/2006)**

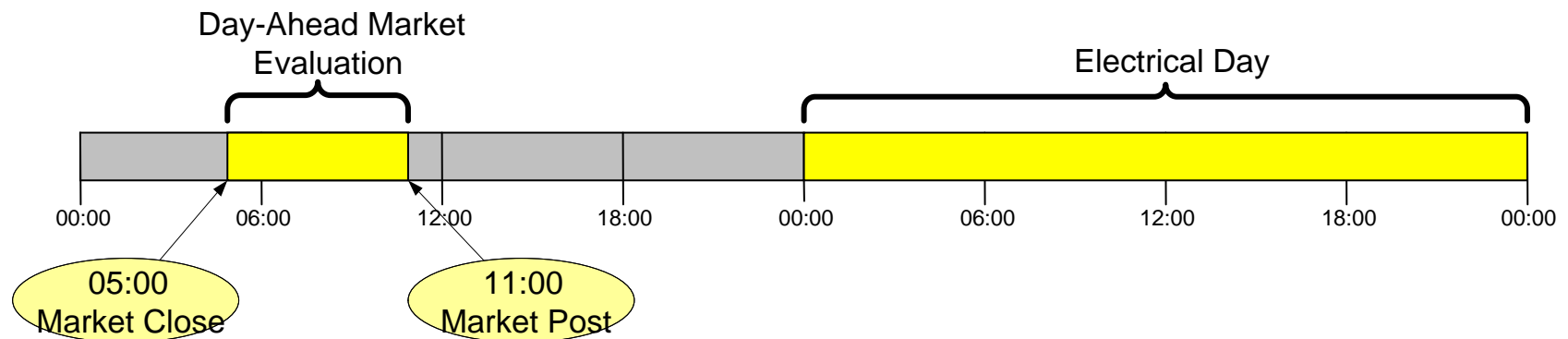


Values closer to zero indicate price convergence. In order to smooth day to day variations, a 28-Day Moving Average of  $ABS((RT/DAM) - 1)$  is used.

# Virtual Trading Rules

- There are collateral requirements that must be met.
- Virtual Load/Supply must have an associated bid. It is scheduled only if the price is right.
- Virtual Load/Supply is always zonal and must be placed at one of NY's 11 load zones.
- Virtual Load/Supply settles at zonal prices.
- Virtual supply may incur a portion of day-ahead uplift costs.

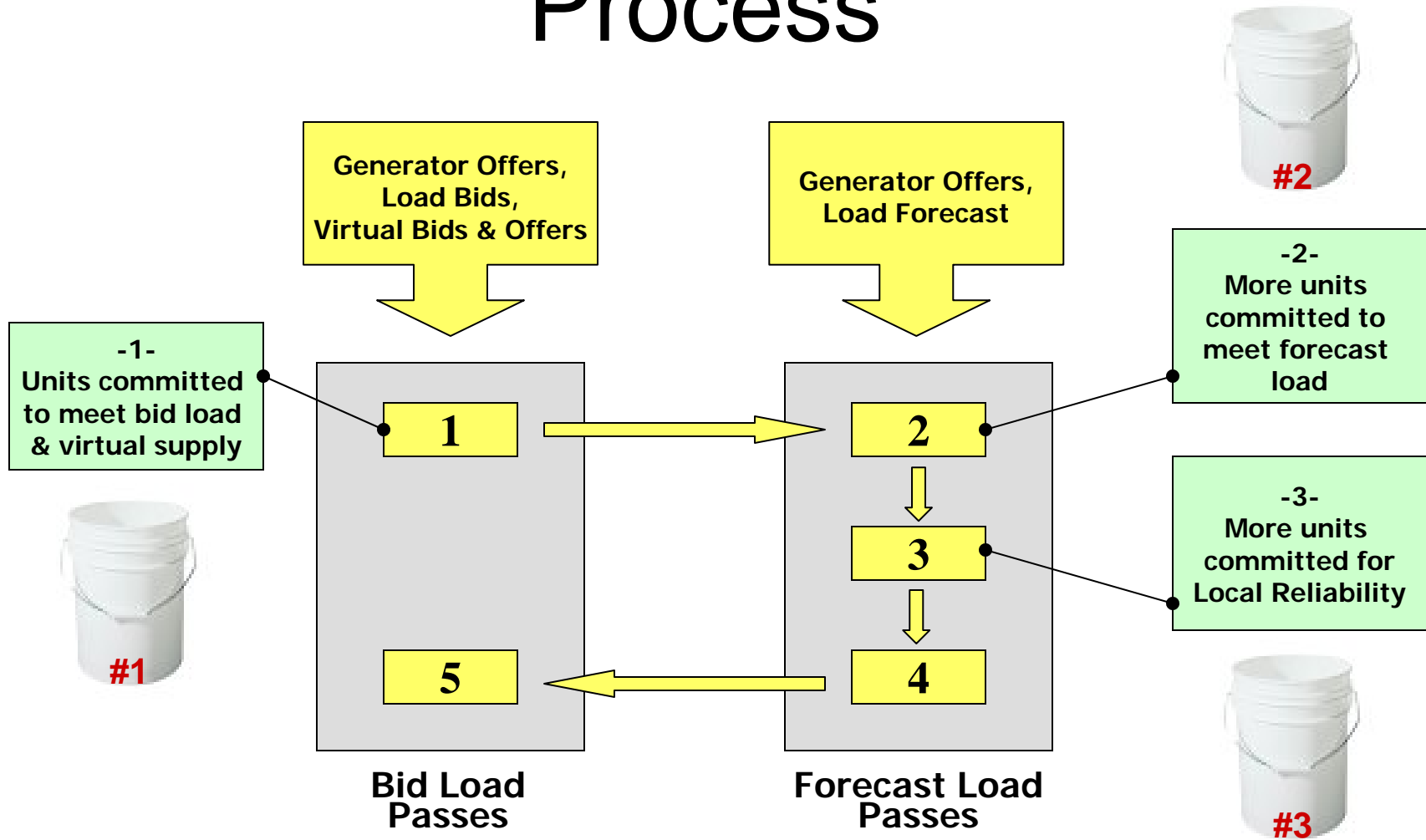
# Day-Ahead Market



- Day-Ahead Market Evaluation generates prices and schedules for the next day. It involves multiple SCUC runs to:
  - Commit and schedule generators to satisfy bid load, virtual load, and virtual supply
  - Commit additional generators to satisfy forecast load (if needed for reliability)
  - Apply mitigation (if needed)



# Day-Ahead Commitment Process



# Uplift Allocation

- Some generating units are committed to meet accepted load bids less accepted virtual supply bids
  - Uplift of these generators is allocated to physical load
- Some generating units may be committed to secure the system using the ISO's best estimate of the next day's load
  - Uplift of these generators is allocated to (i) virtual supply and (ii) physical load that under-bought day-ahead.
- Some generating units may be committed for local reliability
  - Uplift of these generators is assigned to the affected LSEs

