

**Disclaimer for Customer Training:** ISO New England (ISO) provides training to enhance participant and stakeholder understanding. Not all issues and requirements are addressed by the training. Consult the effective [Transmission, Markets and Services Tariff](#) and the relevant [Market Manuals](#), [Operating Procedures](#) and [Planning Procedures](#) for detailed information. In case of a discrepancy between training provided by ISO and the Tariff or Procedures, the meaning of the Tariff and Procedures shall govern.

December 8, 2016

WebEx Broadcast

# Settlements Issues Forum

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*Q4 2016 Meeting*

**Rachel Likover**  
Market Analysis & Settlements



ISO-NE PUBLIC



Note: This presentation was last updated on 12/14/2016. Impacted slides are 42-45 (new).

## Topics



### **Upcoming Settlement/Market Changes – March 2017**

- Sub-hourly settlements
- Fast start pricing and dispatch
- Dispatchable-asset-related demand (DARD) pump parameter changes
- Net Commitment Period Compensation (NCPC) – Dispatch Lost Opportunity Cost (LOC)



### **Sub-hourly Real Time Settlements - Extended Discussion**

- Meter data profiling
- Settlement calculations and reporting
- User interface enhancements



### **Informational Items**

- Metering and resettlement deadlines on the ISO-NE website
- Next meeting date
- Tentative 2017 SIF meeting dates

# Upcoming Settlement/Market Changes March 2017

- *Sub-hourly Real-Time Settlement*
- *Fast Start Pricing and Dispatch*
- *Dispatchable Asset Related Demand (DARD) Pump  
Parameter Changes*
- *NCPC Dispatch Lost Opportunity Cost (LOC)*



# Sub-hourly Real-Time Settlement

March 1, 2017



*Further sub-hourly discussion later in this presentation.*

## Joint ISO-NE/NEPOOL Filing

- Real-Time settlements performed at sub-hourly (5 minute) interval
  - Energy
  - Reserves
  - Net Commitment Period Compensation (NCPC)
- Provide more accurate compensation, especially for flexible resources that respond quickly
- Add and revise MIS Reports
  - Current hourly reports will have some revisions
  - New reports will detail sub-hourly calculations
- New MIS report descriptions are available on ISO-NE website
  - Additional info [here](#)
- Customer readiness information is available [here](#)

Joint ISO-NE/NEPOOL FERC Filing

[ER16-1828-000](#)

# Fast Start Pricing and Dispatch

March 1, 2017 \*



## Joint ISO-NE/NEPOOL Filing

- Fast Start generators will set LMP under broader range of conditions
- Improve performance incentives for all resources
- Introduce new NCPC payment, Rapid Response Pricing Opportunity Cost, to compensate resources postured down when fast start units are setting price

Joint ISO-NE/NEPOOL FERC Filing

[ER15-2716-000](#)

*ISO proposes to implement this project concurrently with Sub-hourly settlement; pending approvals.*

# DARD Pump Parameter Changes

March 1, 2017\*



## Joint ISO-NE/NEPOOL Filing

- Improve modeling and dispatch of pump storage hydro resources in pumping mode
- Provide new bidding parameters for pumps
- Improve outcome for pump storage owners and for market as a whole through more optimal dispatch solutions

Joint ISO-NE/NEPOOL FERC Filing

[ER16-954-000](#)

*ISO proposes to implement this project concurrently with Sub-hourly settlement; pending approvals.*

# NCPC – Dispatch Lost Opportunity Cost (LOC)

March 1, 2017\*



## Market Rule Provision Modifications

1. New provision for Net Commitment Period Compensation (NCPC)
  - NCPC Dispatch LOC to provide the financial incentive for resources to follow dispatch instructions when the DDP (desired dispatch point) is lower than the EDP (economic dispatch point)
2. Dispatchable asset-related demand (DARD) pump provisions aligned with sub-hourly settlement

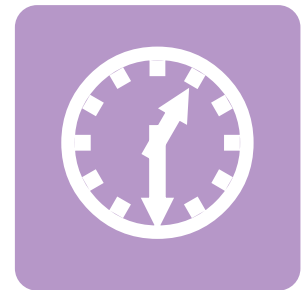
Markets Committee Materials  
September 13, 2016 Meeting

[A04 - NCPC Modifications for Sub-hourly Real-Time Settlement](#)

\* Pending ISO/NEPOOL filing and FERC approval

# Sub-Hourly Real-Time Settlements

- *Meter data profiling*
- *Settlement calculations and reporting*
- *User interface enhancements*





# Sub-Hourly Real-Time Settlements

*Meter data profiling*



# Sub-hourly RT Settlement

*Overview of Impacts for Market Participants*



## Market Participant Data Submittal to ISO New England

- No changes required for Sub-hourly settlement!

## ISO New England Meter Data Treatment

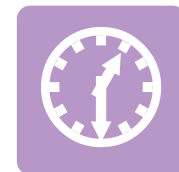
- ISO New England will use profiling process to convert hourly generation and load meter data values to 5-minute interval data

Meter readings will be ***profiled*** to the 12, 5-minute intervals in an hour



# Sub-hourly Real-Time Settlement

## Sub-hourly meter profiling methods



### Telemetry Profiling

- Hourly Scaling factor:
  - Hourly RQM MWh/Hourly Average Telemetry MWh
- Each 5-minute telemetry value in an hour is multiplied by this factor
  - Result is 12 sub-hourly values, which average to the RQM value

- Generators
- DARDs

### Flat Profiling

- Hourly RQM value is used for each of the 12 sub-hourly values

- Load
- Settlement Only Generators
- Generators or DARDs that fail the variance test\*

#### \*Acronym:

RQM: Revenue Quality Metering

#### \* Hourly variance test

If the difference between telemetry and metered value is > 20% of metered value, and the difference is > 10 MWh, then telemetry profiling not used. Generator is flat profiled for that hour.

# Sub-hourly Real-Time Settlement

## Example 1: Generator Telemetry Profiling



Sub-hour Interval Begin Time	Telemetry Gen MWh	Profiled Gen Scaling Factor x Telemetry
:00	35	39.375
:05	35	39.375
:10	40	45
:15	40	45
:20	40	45
:25	40	45
:30	40	45
:35	40	45
:40	40	45
:45	40	45
:50	45	50.625
:55	45	50.625
<b>Average Generation</b>	<b>40</b>	<b>45</b>
<b>RQM Generation</b>	<b>45</b>	
<b>Scaling Factor (RQM / Telemetry Average)</b>		<b>1.125</b>

### Variance Test:

Telemetry – RQM = 5 MWh

✓  $\leq 20\%$  of the metered value  
 $5 \text{ MWh} < (.20 \times 45 \text{ MWh})$

✓  $\leq 10 \text{ MWh}$   
 $5 \text{ MWh} < 10 \text{ MWh}$

➔ **OK for telemetry profile**

*Telemetry profile examples are for conceptual purposes only.*

# Sub-hourly Real-Time Settlement

## Example 2: Generator Telemetry Profiling



Sub-hour Interval Begin Time	Telemetry Gen MWh	Profiled Gen Scaling Factor x Telemetry
:00	0	0
:05	0	0
:10	0	0
:15	0	0
:20	0	0
:25	0	0
:30	100	100
:35	100	100
:40	100	100
:45	100	100
:50	100	100
:55	100	100
<b>Average Generation</b>	<b>50</b>	<b>50</b>
<b>RQM Generation</b>	<b>50</b>	
<b>Scaling Factor (RQM / Telemetry Average)</b>		<b>1.00</b>

### Variance Test:

**Telemetry – RQM = 0**

No variation between  
telemetry and RQM!

→ **OK for telemetry profile**

**Profile = telemetry**

*Telemetry profile examples are for conceptual purposes only.*

# Sub-hourly Real-Time Settlement

## *Current Sub-hourly Data Sources*



- Energy and reserve prices
  - Currently determined at the 5-minute level
  - Integrated to hourly:
    - LMP
    - TMSR RMCP, TMNSR RMCP, TMOR RMCP\*

### **\* Acronyms:**

RMCP: Reserve Market Clearing Price

TMSR: Ten Minute Spinning Reserve

TMNSR: Ten Minute Non-Spinning Reserve

TMOR: Thirty Minute Operating Reserve

# Sub-Hourly Real-Time Settlements

*Settlement calculations and reporting*



# Sub-hourly Real-Time Settlement



ISO Will Use **Generator Telemetry** to Profile Generation



## Generation Example: \*

Generator submits meter reading value:  
**Hour Ending 01: 50 MWh**

\* Simplified RT Energy settlement for case with no cleared DA generation. DA position not shown.

### Old Way

1 hour Interval; Hour End	Gen MWh	LMP (\$/MWh)	Hourly Settlement Gen x LMP
01	50	\$36	\$1,800.00

1 hour Interval; Hour End	Gen MWh	LMP	Hourly Settlement Roll-up
01	50	\$36	\$2,100.00

**Summation of 12 sub-hourly intervals**

### New Way

Per generator telemetry\*\*, generator is:

- Off line for first 30 minutes of the hour
- Online at 100 MW output level for the last 30 minutes of the hour

Sub-hour Interval Begin Time	Profiled Gen MWh	5" LMP \$/MWh	5 " Interval Settlement (Gen x LMP)/12
:00	0	\$25	\$0.00
:05	0	\$27	\$0.00
:10	0	\$29	\$0.00
:15	0	\$31	\$0.00
:20	0	\$33	\$0.00
:25	0	\$35	\$0.00
:30	100	\$37	\$308.33
:35	100	\$39	\$325.00
:40	100	\$41	\$341.67
:45	100	\$43	\$358.33
:50	100	\$45	\$375.00
:55	100	\$47	\$391.67

\*\* Per Slide 13, for this example, telemetry scaling factor =1. Profiled generation = telemetry values.



# Sub-hourly Real-Time Settlement



New convention for sub-hour interval begin time



## Generation Example: \*

Generator submits meter reading value:

**Hour Ending 01: 50 MWh**

\* Simplified RT Energy settlement for case with no cleared DA generation. DA position not shown.

Although the settlement interval Hour End will not change, the sub-hour interval convention is now Interval Begin.

1 hour Interval; Hour End	Gen MWh	LMP	Hourly Settlement Roll-up
01	50	\$36	\$2,100.00

Summation of 12 sub-hourly intervals

## New Way

Per generator telemetry\*\*, generator is:

- Off line for first 30 minutes of the hour
- Online at 100 MW output level for the last 30 minutes of the hour

Sub-hour Interval Begin Time	Profiled Gen MWh	5" LMP \$/MWh	5 " Interval Settlement (Gen x LMP)/12
:00	0	\$25	\$0.00
:05	0	\$27	\$0.00
:10	0	\$29	\$0.00
:15	0	\$31	\$0.00
:20	0	\$33	\$0.00
:25	0	\$35	\$0.00
:30	100	\$37	\$308.33
:35	100	\$39	\$325.00
:40	100	\$41	\$341.67
:45	100	\$43	\$358.33
:50	100	\$45	\$375.00
:55	100	\$47	\$391.67

\*\* Per Slide 13, for this example, telemetry scaling factor =1. Profiled generation = telemetry values.

# Sub-hourly Real-Time Settlement



Example of Sub-hourly calculations for Day-Ahead Cleared Generator

## Generation Example:

Generator clears Day-Ahead:



① Hour Ending 01: 100 MWh

Generator submits meter reading value:

② Hour Ending 01: 50 MWh

Hour End	Cleared Gen MWh	DA LMP	DA Settlement
01	100	\$40	\$4000

① DA: No Change

Hour End	Metered Gen	Real Time Deviation from DA	RT LMP	RT Settlement
01	50	-50	\$36	-\$1800

② RT: Old Way

Hour End	Metered Gen	Real Time Deviation from DA	RT LMP	RT Settlement Hourly Roll-up
01	50	-50	\$36	-\$1500

② RT: New Way

DA hourly value is "flat"

Sub-hour Interval	DA Cleared Gen MWh	Profiled Gen MWh	RT Deviation MWh	5" LMP \$/MWh	5" Interval Settlement (Gen x LMP)/12
:00	100	0	-100	\$25	-\$208.33
:05	100	0	-100	\$27	-\$225.00
:10	100	0	-100	\$29	-\$241.67
:15	100	0	-100	\$31	-\$258.33
:20	100	0	-100	\$33	-\$275.00
:25	100	0	-100	\$35	-\$291.67
:30	100	100	0	\$37	\$0.00
:35	100	100	0	\$39	\$0.00
:40	100	100	0	\$41	\$0.00
:45	100	100	0	\$43	\$0.00
:50	100	100	0	\$45	\$0.00
:55	100	100	0	\$47	\$0.00

Summation of 12 sub-hourly intervals

# Sub-hourly Real-Time Settlement

*Load Will Be Flat Profiled\**



**Load Example:**  
Hour Ending 01: -50 MWh

## Old Way

1 hour Interval	Load MWh	LMP (\$/MWh)	Hourly Settlement Load x LMP
01	-50	\$36	-\$1,800.00

## New Way

Sub-hour Interval Begin Time	Profiled Load MWh	5" LMP	5" Interval Settlement (Load x LMP)/12
:00	-50	\$25	-\$104.17
:05	-50	\$27	-\$112.50
:10	-50	\$29	-\$120.83
:15	-50	\$31	-\$129.17
:20	-50	\$33	-\$137.50
:25	-50	\$35	-\$145.83
:30	-50	\$37	-\$154.17
:35	-50	\$39	-\$162.50
:40	-50	\$41	-\$170.83
:45	-50	\$43	-\$179.17
:50	-50	\$45	-\$187.50
:55	-50	\$47	-\$195.83

(total of 12 intervals above)

Total for Hour Hour Ending	Load MWh	LMP	Hourly Settlement Roll-up
01	-50	\$36	-\$1800.00

\* *Flat profile*: All 5 minute intervals will have the same load level.

# Sub-hourly Real-Time Settlement

*Changes to Coordinated Transaction Scheduling (CTS) Location Reporting*



## When sub-hourly settlements are implemented:

- 15 minute interval reporting will be retired
- No change to Coordinated External Transaction (CET) 15 minute interval scheduling
- CTS locations included in the 5 minute reports
  - Roseton, Location ID = 4011
- 15 minute interval reported as three, 5 minute intervals

### Old Way

Sub-hour Interval	CTS Location	15 " LMP	15 " Interval Settlement (CET x LMP)/4
:15	100	\$27	\$675.00
:30	0	\$33	\$0.00
:45	100	\$39	\$975.00
:00	0	\$45	\$0.00
<b>TOTAL</b>			<b>\$1,650.00</b>

Today's Settlement MIS hourly reports for Real-Time Energy Market include 15-minute interval reporting for CTS location only

# Sub-hourly Real-Time Settlement

Changes to Coordinated Transaction Scheduling (CTS) Location Reporting



Old Way			
Sub-hour Interval	CTS Location	15 " LMP	15 " Interval Settlement (CET x LMP)/4
:15	100	\$27	\$675.00
:30	0	\$33	\$0.00
:45	100	\$39	\$975.00
:00	0	\$45	\$0.00
<b>TOTAL</b>			<b>\$1,650.00</b>



## Remember...

The product of hourly values is **not** equivalent to roll-up!

Hourly values: 50 MWh × \$36/MWh = \$1800

Sub-hour Interval Begin Time	CTS Location MWh	5 " LMP \$/MWh	5 " Interval Settlement (CET x LMP)/12
:00	100	\$25	\$208.33
:05	100	\$27	\$225.00
:10	100	\$29	\$241.67
:15	0	\$31	\$0.00
:20	0	\$33	\$0.00
:25	0	\$35	\$0.00
:30	100	\$37	\$308.33
:35	100	\$39	\$325.00
:40	100	\$41	\$341.67
:45	0	\$43	\$0.00
:50	0	\$45	\$0.00
:55	0	\$47	\$0.00
<b>TOTAL</b>			<b>\$1,650.00</b>

1 hour Interval; Hour End	Contract MWh	LMP \$/MWh	Hourly Settlement Roll-up
01	50	\$36	\$1,650.00

# Sub-hourly Real-Time Settlement

## Overview of Reporting Changes



## Reporting Changes for Sub-hourly Settlements:

- Energy Market
- Reserve Market
- Net Commitment Period Compensation
- Regulation
  - Market settlement is not sub-hourly
    - However, Regulation Opportunity Cost component is determined at sub-hourly level

### Changes include:

- Adding new, 5 minute level reports that roll up to hourly values (majority of changes)
- Addition/deletion/redefinition of data fields in current reports
- Structural changes to current NCPC payment reports
- Updated report descriptions (available now!)

*Subscribe to the **MIS Report Issues** mailing list on the ISO Website!*

<http://www.iso-ne.com/participate/support/mailing-lists>

# Sub-hourly Real-Time Settlement

Overview of Settlement Impacts for all Market Revisions in March, 2017



Market	Settlement Report Changes - High Level *
Day-Ahead Energy	None.
Day-Ahead NCPC	New DARD settlement.
Real-Time Energy	Settlement will change from 1 hour to 5-minute time interval.
Real-Time NCPC	Settlement will change from 1 hour to 5-minute time interval. Payment and Generation reports will be retired and replaced. New DARD and Dispatch LOC settlement.
Reserve Market	Forward Reserve Market (FRM) settlement remains at 1 hour interval. Real-Time Reserve settlement will change from 1 hour to 5-minute time interval.
Regulation Market	Settlement remains at 1 hour interval; one component, Regulation Opportunity Cost, will be determined at 5-minute interval.
Financial Transmission Rights	None.
Forward Capacity Market	None.
Transitional Demand Response	None.

\* Note: As of March 1, 2017, many current MIS settlement reports will incorporate revisions to indicate that hourly data are the summation of 5-minute settlements. **These summations replace the original hourly calculations.** The 5-minute settlement information will be provided on new MIS reports. See [Slide 4](#) for link to MIS report changes.

# Sub-hourly Real-Time Settlement

*Additional MIS Report detail*



## Streamlining of Reserve Market MIS Reports

- Current Reserve Market MIS reporting include rows of data where the values are all zero
- The reports will be streamlined to eliminate rows where there is no market activity
- Streamlining will apply to new versions of hourly reports, and to sub-hourly detail





# Sub-Hourly Real-Time Settlements

*User interface enhancements*



# Sub-hourly Real-Time Settlement

*Meter Reading User Interface (UI) Enhancements*



**At project implementation, an upgraded version of the Meter Reading User Interface (UI) will be released**

- New UI has enhancements for current meter read submittal process
- New UI will be able to accept sub-hourly readings at a future date
  - Sub-hourly reading submittals will require approval in asset registration process
    - Requires data validation process with Host Participant meter reader

# Sub-hourly Real-Time Settlement

## *Meter Reading User Interface (UI) Enhancements*



### Using the Meter Reading UI as of March 1, operating day:

- The appearance of the UI will be slightly different
- The process for using the UI essentially unchanged
- Enhancements to the UI will improve the meter submittal process
  - Better feedback to user during data upload processing
  - Option to submit data files in compressed “GZIP” format
  - CSV upload format unchanged; XML format upgraded to new version
    - New XML provides better messaging and easier testing process
- REST web services submittal available for both CSV and XML format
- Upgraded Meter Reading UI will not be accessible via HTML “scraping”
  - Convert custom HTTP client that simulates web browser Metering UI to REST web services

Screenshots can be found in [Appendix A](#) of this presentation.

# Sub-hourly Real-Time Settlement

*Meter Reading User Interface (UI) Enhancements*



Sub-hourly  
Real-Time  
Settlement

## Sandbox for Meter Reading UI is open now!

- File formats for CSV uploads for hourly data unchanged, same as today
- XML upload/download formats available [here](#)
- Webservices data exchange specifications available [here](#)
- Link for sandbox
  - <https://sandboxsmd.iso-ne.com/>
  - Your security administrator may need to assign application role for access
  - Role is “SMS Sandbox”



# Questions?



## Informational Items

- Settlements Information on ISO-NE Website
- Next Settlement Issues Forum Date
- Questions & Discussion



# Settlement Information on the ISO Website



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About Us

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System Planning

Markets and Operations

## ISO Express

- Real-Time Maps and Charts
- Pricing Reports
- Grid Reports
- Energy, Load, and Demand Reports
- Operations Reports
- Billing, Settlements, and Tariff Reports
- Auctions Reports
- Retired Reports

## Markets Data and Information

- Day-Ahead and Real-Time Energy Markets
- Forward Capacity Market
- Financial Transmission Rights
- Forward Reserve Market and Real-Time Reserve Pricing
- Net Commitment-Period Compensation
- Regulation Market
- Voltage Support
- Blackstart Service
- Demand Resources
- Winter Program Payment Rate

## Power System Forecast and Status

- Morning Report
- Seven-Day Capacity Forecast
- Three-Day System Demand Forecast
- Current Power System Status

## Market Performance

- Market Performance Reports
- Load Costs

## Market Monitoring and Mitigation

- Internal Market Monitor
- External Market Monitor

## Market Development

- Wholesale Markets Project Plan

## Settlements

- Understanding the Bill
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- Settlement and Metering Holidays
- Quarterly Settlements Forum
- Metering and Resettlement Deadlines
- Tariff Rates
- Rate Development of Regional Transmission Charges
- Generation Information System
- Emergency Power Sales and Purchases
- FERC Electric Quarterly Reporting
- Pricing-Node Table

## Transmission Operations and Services

- Transmission Service Types
- Transmission Outage Scheduling
- OASIS Materials
- Operational Transmission Limits



Facilitating competitive markets and reliable wholesale electricity delivery in New England

Screenshots can be found in [Appendix B](#) of this presentation.

# Settlements Issues Forum Dates 2016



**Thursday, March 10 at 10:00 AM**



**Thursday, June 9 at 10:00 AM**



**Thursday, September 8 at 10:00 AM**



**Thursday, December 8 at 10:00 AM**



# Tentative 2017 Settlements Issues Forum Dates



**Q1**

**Thursday, March 2 at 10:00 AM**

**Q2**

**Thursday, June 8 at 10:00 AM**

**Q3**

**Thursday, September 7 at 10:00 AM**

**Q4**

**Thursday, December 7 at 10:00 AM**

# APPENDIX A:

## *Meter Reading User Interface Screenshot Examples*

# Sub-hourly Real-Time Settlement

## Meter Reading User Interface (UI) Enhancements

### Energy Assets Data Submittal



Energy Assets | FCM Demand Assets

Meter Reader:  ...

Begin Date:

End Date:

Asset Type:

Missing/Exceeded:

ID	Name	Type	SubType	Date
101	GENERATOR 101	Unit	COAL	03/01/2017
109	GENERATOR 109	Unit	COAL	03/01/2017
110	GENERATOR 110	Unit	GAS	03/01/2017
111	GENERATOR 111	Unit	COAL	03/01/2017
119	GENERATOR 119	Unit	COAL	03/01/2017
121	GENERATOR 121	Unit	COAL	03/01/2017
122	GENERATOR 122	Unit	COAL	03/01/2017
123	GENERATOR 123	Unit	COAL	03/01/2017
124	GENERATOR 124	Unit	COAL	03/01/2017

Page 1 of 1 | 1 - 9 of 9

Hour Ending	Meter Reading	Hour Ending	Meter Reading
0100	0.000	1300	451.130
0200	201.020	1400	451.140
0300	451.030	1500	451.150
0400	451.040	1600	451.160
0500	451.050	1700	451.170
0600	451.060	1800	451.180
0700	451.070	1900	451.190
0800	451.080	2000	451.200
0900	451.090	2100	451.210
1000	451.100	2200	451.220
1100	451.110	2300	451.230
1200	451.120	2400	175.240
total:	9849.99		

User will receive active feedback during upload processing. In event of error; messaging can be provided to ISO Customer Support to aid in problem resolution.

# Sub-hourly Real-Time Settlement

## Meter Reading User Interface (UI) Enhancements

### FCM Demand Assets Data Submittal



Energy Assets **FCM Demand Assets**

Meter Reader: LSE1 ...

Begin Date: 03/01/2017

End Date: 03/01/2017

Metering Configuration: DG Output Directly Metered

Demand Asset Type: All

Reading Exception: All

Retrieve File Upload

ID	Name	Type	SubType	Date
1501	Demand Response Asset 1501	FCM...	ON_PEAK	11/10/2016

<< < Page 1 of 1 > >> 1 - 1 of 1

Meter Readings Have Been Submitted  
Asset: 1501, Demand Response Asset 1501  
Meter Date: 11/10/2016 (Thu)

Hour Ending	DG Output, MW	Total Facility Load, MW	Hour Ending	DG Output, MW	Total Facility Load, MW
0100			1300	0.188	-1.021
0200			1400	0.188	-1.021
0300			1500		
0400			1600		
0500			1700		
0600			1800		
0700			1900		
0800			2000		
0900	0.135	-1.020	2100		
1000	0.125	-1.022	2200		
1100			2300		
1200			2400		
Total:			0.636	-4.084	

Helper Reset Submit

- User will receive active feedback; echo asset ID's as accepted
- In event of upload error; specific messaging will be displayed

# Sub-hourly Real-Time Settlement

*Recap on Data Submittal to Upgraded Meter Reading User Interface (UI)*



## CSV File Uploads

- No changes to hourly meter data upload files

## XML File Uploads

- Change format to new XML; legacy .dtd no longer supported
  - Hour Begin instead of Hour End

## For Either Upload Format, CSV or XML:

- Option available to submit compressed file in GZIP format
  - Write file in GZIP, or
  - Compress file with GZIP tool
- Option for downloading meter data
- Option available to submit via REST web services
- No HTML “scraping”, convert to REST web services
- Functionality for submitting sub-hourly meter data files
  - Submittal via web services only
  - File format as GMT begin time

## APPENDIX B:

*Metering and resettlement deadlines on the ISO-NE website*

# Settlement Information on the ISO Website

## Finding the Metering and Resettlement Deadlines



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System Planning

**1** Markets and Operations

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### Transmission Operations and Services

- Transmission Service Types
- Transmission Outage Scheduling
- OASIS Materials
- Operational Transmission Limits



Facilitating competitive markets and reliable wholesale electricity delivery in New England

# Settlement Information on the ISO Website

Metering and resettlement .pdf file available for download

DOCUMENTS		DATE	TYPE	SIZE
<input checked="" type="checkbox"/>	<b>2017 Metering and Resettlement Deadlines</b> Document contains reference dates, data submission deadlines and meter report schedules for 2017.	12/07/2016	PDF	48KB
<input type="checkbox"/>	<b>2016 Metering and Resettlement Deadlines</b> Document contains reference dates, data submission deadlines and meter report schedules for 2016.	04/28/2016	PDF	44KB

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2017 Metering and Resettlement Deadlines Calendar

Document Title	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17
ISO-NE 2017 Metering and Resettlement Deadlines	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016	12/07/2016
ISO-NE 2016 Metering and Resettlement Deadlines	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016	04/28/2016



# Settlement Information on the ISO Website

*Metering and resettlement page clip*

<b>REFERENCE DATES</b>	<b>Jan-17</b>	<b>Feb-17</b>	<b>Mar-17</b>
Initial Monthly Bill Date	2/13/2017	3/13/2017	4/18/2017
Day One of Data Reconciliation Process	2/1/2017	3/1/2017	4/1/2017
Data Reconciliation Process Bill Date	6/12/2017	7/17/2017	8/14/2017
Meter Data Error RBA Submission Limit	7/12/2017	8/16/2017	9/13/2017
Meter Data Error RBA Resettlement Bill Date	12/11/2017	1/16/2018	2/12/2018
<b>DATA SUBMISSION DEADLINES - DATA RECONCILIATION PROCESS</b>			
Meter Reading UI Opens -- Day Following Initial Monthly Bill Date	2/14/2017	3/14/2017	4/19/2017
Directly Metered Assets -- UI Closes Day 45 @ 17:00	3/17/2017	4/14/2017	5/15/2017
Final Directly Metered Assets -- Email to ISO MSS Day 65 @ 17:00	4/6/2017	5/4/2017	6/4/2017
Preliminary Profiled Load Assets & Peak Contribution -- UI Closes Day 65 @ 17:00	4/6/2017	5/4/2017	6/4/2017

## APPENDIX C:

*Questions received during the December 8, 2016 webinar.*

# Settlements Issues Forum Q4

*Questions received during the December 8, 2016 webinar*

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- 1. Our meter data provider confirmed that they will continue to submit hourly generator meter readings to the ISO. So, what real changes will we see in the settlement?**

For generators and Dispatchable Asset Related Demands (DARDs) that are telemetered to the ISO, the hourly meter data will be profiled to 5-minute intervals each hour, and the 5-minute intervals will be settled at the respective 5-minute LMPs. This produces a different settlement value for any generator or DARD that is not running at a constant level for all 60 minutes of the hour, compared to the hourly settlement that we do today. (See [Slide 16](#) for an example of the hourly vs sub-hourly calculation results.)

For settlement-only generators (< 5 MW, not telemetered to ISO) and load, the meter data will be flat profiled, and so the settlement result will effectively be the same as the hourly settlement performed today. (See [Slide 19](#) for an example of the hourly vs sub-hourly calculation results.)

- 2. If a Market Participant receives RT energy from a generator, through an Internal Bilateral Transaction (IBT), can the IBT be entered to match the 5-minute scaled RQM data? Or does it have to be a flat profile?**

IBTs are flat one-hour instruments; there is no sub-hourly profiling applied.

- 3. Will IBT's be paid on 5-minute intervals?**

In Day-Ahead, IBTs continue to be settled at the hourly level.

In Real-Time, IBTs will be settled at the 5-minute interval, but since the IBT has a flat profile, the actual settlement value will not be different from today. The IBT will effectively be priced in the settlement at the hourly LMP.

- 4. Will all Real Time deviations for Load deals be at the average of the 12 intervals?**

Yes. Real-time load is flat-profiled, as is any Day-ahead activity. The sub-hourly interval load deviations will all be identical to one another in a given hour.

- 5. For the 5-minute sub-hourly settlements, will the hourly data still be published after March 1 for MIS reports and will the value align to the sum of 5-minute values?**

Yes. We will continue publishing hourly reports, as today, but the definition of the hourly settled values will be changed.

For example, in the RT Energy Locational Summary report, the settlement values will not be equal to the product of the hourly Real Time Adjusted Net Interchange Deviation (RT ANID) and the hourly LMP components. Instead, for an hour, those values will be populated with the summation of the set of the 12 like calculations performed at each 5-minute level in that hour.

## Settlements Issues Forum Q4

*Questions received during the December 8, 2016 webinar*

**6. Will you continue to publish an hourly LMP that can be used for Load deals?**

Yes. The hourly Real-Time LMPs will continue to be published, as today.

**7. Similar to the hourly LMP, will the hourly meter data reports still be available?**

Yes. The hourly meter data values will continue to be provided in the MIS reports.

**8. Will the NCPC payment calculations also use 5-minute prices?**

Yes. The NCPC payment calculations will use the 5-minute prices for determining revenue paid to a resource.

**9. What if the profiled generation is 200 MWh/interval for the second half of the hour for the example on [Slide 18](#)?**

In that case, the settlement calculation would be performed as shown below; the deviations would produce charges in the first half of the hour and credits in the second half of the hour. Note that the underlying total metered value would be 100 MWh in this example.

Sub-hour Interval <b>Begin Time</b>	DA Cleared Gen MWh	Profiled Gen MWh	RT Deviation MWh	5" LMP \$/MWh	5 " Interval Settlement (Gen x LMP)/12
:00	100	0	-100	\$25	(\$208.33)
:05	100	0	-100	\$27	(\$225.00)
:10	100	0	-100	\$29	(\$241.67)
:15	100	0	-100	\$31	(\$258.33)
:20	100	0	-100	\$33	(\$275.00)
:25	100	0	-100	\$35	(\$291.67)
:30	100	200	100	\$37	\$308.33
:35	100	200	100	\$39	\$325.00
:40	100	200	100	\$41	\$341.67
:45	100	200	100	\$43	\$358.33
:50	100	200	100	\$45	\$375.00
:55	100	200	100	\$47	\$391.67
<b>TOTAL:</b>					\$600.00

**10. Why are you using interval begin time rather than interval ending time for the sub-hourly 5-minute intervals?**

The 5-minute begin time interval is consistent with the convention that the ISO currently uses in the publication of the 5-minute LMP data. Note that the settlement hourly reporting will continue to use the Hour End convention for all hourly intervals. (Hour interval: Interval End. Sub-hour interval: Interval Begin.)

## 11. Will the reports be labelled begin time vs end time?

Yes. Hourly intervals will be labeled for hour end, and sub-hourly intervals will be labeled for interval begin.

## 12. Can we get a breakdown of the billing line items that shows exactly what is going to change?

The bill line items will not change under sub-hourly settlement, but the calculations that create the \$ in each line item will be different.

For example, RT Energy will now be calculated at the sub-hourly level, and rolled up to the bill. Note that we will continue to provide you with hourly level values in the same MIS reports that are issued today, but these hourly level values are calculated by adding up all of the sub-hourly values

## 13. Will the new 5-minute calculations for load settlements will always equal the old calculation?

Yes. The roll-up of 5-minute flat profiled load energy settlement values will be equal to the hourly calculation that is performed today. (See [Slide 19](#) for an example of the load calculation results.)

The cost allocation provisions for hourly markets have not changed, and so any load-based allocator will continue to use the hourly total MWh.

## 14. Will the EQR reports report hourly or 5-minute interval data?

Yes, the EQR reports will be modified to reflect the actual settlement intervals.

## 15. If load isn't being billed on 5-minute increments, isn't that a disconnect from the corresponding 5-minute incremented resource cost?

Yes, but this issue is not new to the settlement. Today, load can pay a different amount for energy than is paid to generators. Any imbalances are addressed through the settlement of the Real-Time loss revenue and the Real-Time congestion revenue.

## 16. How will the ISO profile tie-line data for meter domains?

The domain balancing is still an hourly calculation, and so no profiled tie-line data will be echoed to the meter readers.

In the math of the generator profiling process for settlement, the tie-lines are considered as flat profiles.

## 17. Was any of this process tested in the SOC Type 2 report that was just issued?

No. The 2016 report did not include the Sub-hourly settlement project. The 2017 report will reflect the audit of the Sub-hourly settlement as of the project implementation date. This conforms with the same process that is in place each time a new project goes live.