

Appendix Material

What's in the Appendix?

Demand Resource Settlement
Data Requirements, Submittal Deadlines, and
Submittal Interfaces

Baseline Calculation Details

Summary of Demand Resource
Performance Calculations

Answers to Presentation Questions and Solutions to Exercises

Exercise Answer Sheet

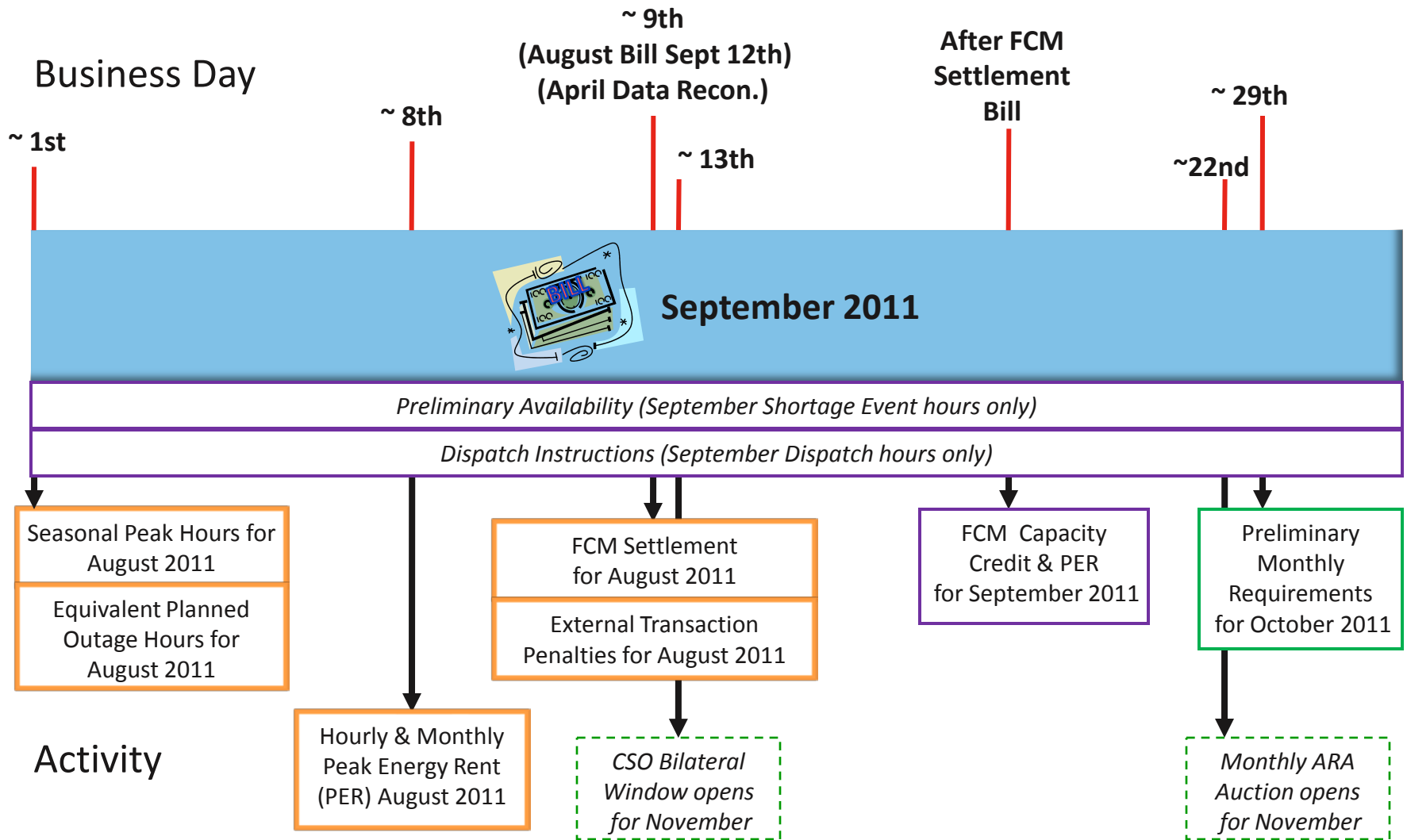
Settlement Timeline Exercise

- Assuming you are in the month of September, identify the associated obligation month for each of the activities below.
 - For example, in September, the Monthly PER report will be issued for August.

<u>August</u>	FCM Settlement
<u>September</u>	Preliminary Availability
<u>October</u>	Monthly Requirements
<u>August</u>	Equivalent Planned Outage Hours
<u>August</u>	Monthly PER Report
<u>August</u>	Seasonal Peak Hours Report
<u>August</u>	External Transaction Penalties
<u>September</u>	FCM Credit & PER Adjustment
<u>September</u>	DR Dispatch Instruction
<u>August & April*</u>	Bill Invoice (Initial Bill, * Data Reconciliation Bill)

Exercise Answer Sheet

Settlement Timeline Exercise



Exercise Answer Key

FCM Credit & PER Adjustment Exercise

Description	Rate* (\$/kW-mo)	Description	Rate* (\$/kW-mo)
FCA Clearing Price	\$4.50	MRA Clearing Price	\$1.50
FCA Payment Rate	\$5.00	Bilateral Rate	\$2.00
ARA Clearing Price	\$1.00	Peak Energy Rent	\$3.00

Credit/Adjustment	CSO MW	Payment Rate (\$/kW-mo)	Credit/Adjustment
+ FCA – Existing Capacity	65	\$5.00	\$325,000.00
+ FCA – Self-Supply	20	\$0.00	\$0.00
+ MRA Purchase	10	\$1.50	\$15,000.00
+ CSO Bilateral Contract	(25)	\$2.00	(\$50,000.00)
- PER	50	\$3.00	\$150,000.00
Totals ECO + SS + MRA + IBT - PER	70 (CSO) 50 (PER CSO)		\$140,000.00

*Not all rates are used

Exercise Answer Key

Available MW for Generating Resource

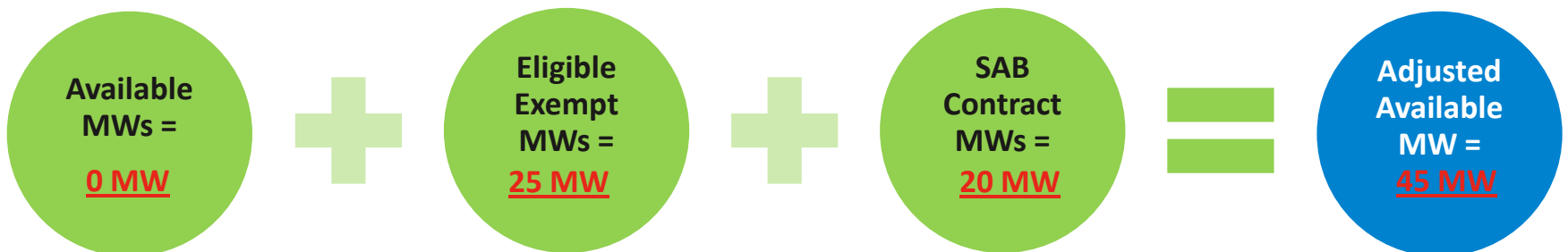
Instructions: Using the concepts introduced in this section, calculate the Available MW in each case below. Assume all resources are dispatchable by the ISO.

	Eco Max	Metering MW	Start-Up + Notification Time	External Transaction Sale MW	Competitive Offer MW	Other	Available MW
1	200	0	≤ 30 minutes	0	N/A	N/A	200
2	200	195	> 30 minutes, ≤ 12 hours	0	150	N/A	200
3	200	0	> 30 minutes, ≤ 12 hours	0	175	N/A	175
4	200	200	> 12 hours	0	N/A	N/A	200
5	200	200	> 30 minutes, ≤ 12 hours	75	200	N/A	125
6	200	5	≤ 30 minutes	0	N/A	Ramping down	200

Exercise Answer Key

Calculate Hourly Available MWs

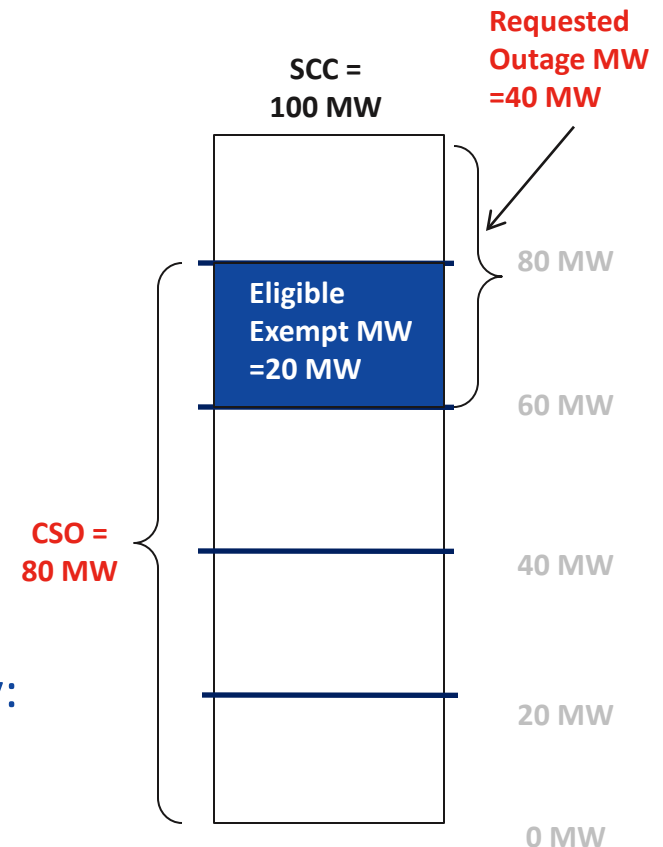
- Generator B is on a forced outage. A Shortage Event occurs during the outage period. Asset values are:
 - Offline. Eco Max = 0 MW
 - An Annual Maintenance Outage, flagged as “FCM Exempt” and in the amount of 25 MW, occurs during the Shortage Event period.
 - Generator B is the Supplemented Resource in a SAB. The contract amount is 20 MW.



Exercise Answer Key

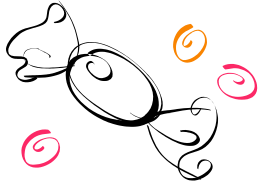
Equivalent Planned Outage

- Outage and Resource Information
 - Seasonal Claimed Capability = 100 MW
 - Outage Amount Requested = 40 MW
 - Capacity Supply Obligation = 80 MW
 - Outage Length = 1 day (24 hours)
- Eligible Exempt MW = 20 MW $[80 - (100 - 40)]$
- Equivalent Planned Outage Hour = .25 hours $(20 / 80)$
- For the entire outage, the Remaining Available Allotment Hours will be reduced by: 6 hours $(24 \times .25)$



Question Answer Key

Before We Get Started...



What is a Demand Resource?

Answer:

Demand Resources are installed measures (i.e., products, equipment, systems, services, practices and/or strategies) that result in verifiable reductions in end-use demand on the grid, with a minimum size of 100 kW. (paraphrase from Market Rule 1 definitions)



Question Answer Key

Before We Continue...



What are the two FCM categories for Demand Resources?

Answer:

FCM has two categories for Demand Resources:

1. Passive

- On-Peak
- Seasonal Peak



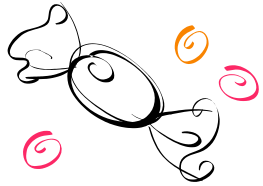
2. Active

- Real-Time Demand Response
- Real-Time Emergency Generation



Question Answer Key

Before We Continue...



What is the third category of Real-Time Demand Resources are and how they fit with these two?

Answer:

The third category of Demand Resources is:

1. Real-Time Price Response Assets

Real-Time Price Response Assets voluntarily respond to events and receive energy payments only outside of FCM.

Exercise Answer Key

Asset & Resource Interrupted MW

Identify Performance Hours, Calculate Interrupted MW

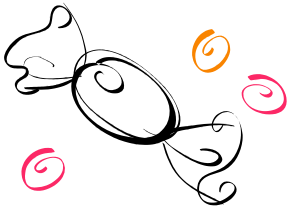
RTDR Event Hours
RTEG Event Hours

Interrupted MW for each Asset and the Resource Total Interrupted MW:

Interval	Asset ID	DDE Dispatch	Max Capacity	Baseline (A)	Actual (B)	Interrupted MW (A - (-1 x B))
1400	123	No	1.750	2.650	-2.850	-0.200 (additional load)
1400	345	No	1.250	1.850	-0.950	0.900
1400	567	No	1.500	2.75	-2.950	-0.200 (additional load)
1400	789	Yes	2.250	3.550	-1.450	2.100
1400	912	Yes	2.000	3.100	-1.150	1.950
Resource Totals						4.550

Question Answer Key

Before We Continue ...



What two values does the ISO compare to determine when an hour is a Seasonal Peak Hour?

Answer:

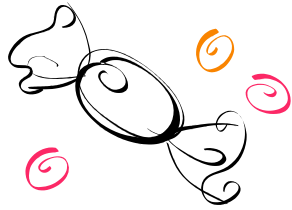
ISO compares the following two values:

1. Real-Time hourly integrated load for the pool
2. Most recent seasonal 50/50 peak load forecast

A hour is designated a Seasonal Peak Hour during applicable season's performance months, when any portion of an hour, on Monday through Friday, non-Demand Response holidays, where the actual Real-Time hourly integrated load for the pool is equal to or greater than 90% of the most recent 50/50 peak load forecast for the applicable summer or winter season.

Question Answer Key

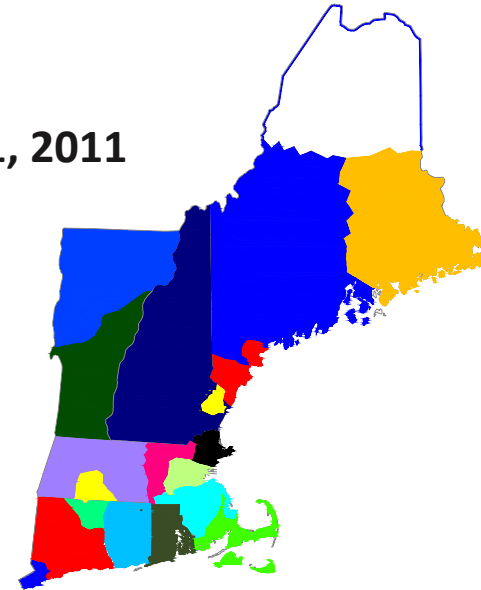
Before We Continue ...



When will the ISO begin dispatching Active Demand Resources by Dispatch Zone?

Answer:

The 2011/2012 Capacity Commitment Period which begins **June 1, 2011**
Dispatch Zone mapping is available on ISO's Web site at
[Settlements > Settlement Model Information \(PNODE Table\)](#)



Exercise Answer Key

Effective Time of a Dispatch Instruction

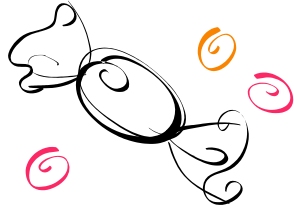
Calculate Dispatch
Deviations & Hourly
Performance Values

Issue Time (Date & Time)	Dispatch MW	Effective Time (Date & Time)	End Time** (Date & Time)
7/2/2010 7:45 AM	2.000	7/2/2010 8:15 AM	7/2/2010 8:15 AM
7/2/2010 8:00 AM	1.000	7/2/2010 8:15 AM	7/2/2010 9:45 AM
7/2/2010 9:15 AM	1.500	7/2/2010 9:45 AM	7/2/2010 10:15 AM
7/2/2010 9:45 AM	2.000	7/2/2010 10:15 AM	7/2/2010 11:00 AM
7/2/2010 11:00 AM	1.500	7/2/2010 11:00 AM	7/2/2010 12:10 AM
7/2/2010 12:10 PM	0.000	7/2/2010 12:10 PM	

**End Time is for Settlements' use only and will not appear on a dispatch instruction

Question Answer Key

Before We Continue ...

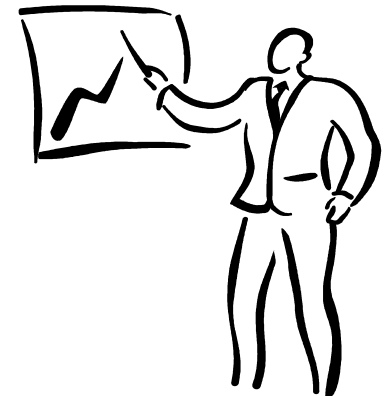


How many different baseline calculations does the ISO use?

Answer:

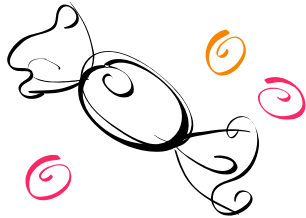
There are two different baseline calculations performed by the ISO:

1. Facility Metered Load (FML)
2. Total Facility Load (TFL)



Question Answer Key

One Last Question ...



Where do you find Data Submittal Deadlines for Demand Resources?

Answer:

Data submittal deadlines are found in:
Market Rule 1 Accounting Manual M-28

Demand Resource Settlement Data Requirements, Submittal Deadlines, Submittal Interfaces and Exercise

Settlement Data Requirements

Active & Passive Demand Resource Assets

DR Type	Metering Configuration	Load Submittal	DG Submittal	ISO Approval Required	Supporting Files Required
On-Peak or Seasonal Peak	Load Reduction Reported pursuant to M&V	MPV (MW of Load Reduction across performance hrs)	N/A	Yes	Yes
On-Peak or Seasonal Peak	DG Output Directly Metered	Hourly MW from Facility Billing Meter for performance hrs	Hourly MW of DG Output for performance hours	Yes	Yes
RTDR	Load Reduction Reported pursuant to M&V	0	5-min Output (Load Reduction) all intervals	No	No
RTDR	Load Reduction – No DG at the Asset	5-min Load all intervals	0	No	No
RTDR	Load Reduction – DG used to reduce load at another on-site asset	5-min Load all intervals	5-min DG Output from on-site asset all intervals	No	No
RTDR or RTEG	DG Output Directly Metered	Hourly MW from Facility Billing Meter for performance hrs	5-min DG Output all intervals	No	No
RTEG	Load Reduction – DG Used to reduce load	5-min Load all intervals	0	No	No
RTEG	DG Used to reduce load and DG used to reduce load at another on-site asset	5-min Load all intervals	5-min DG Output from on-site asset all intervals	No	No

ISO New England Data Submittal Interfaces

Active & Passive Data Submittal

DR Type	Metering Configuration	RTU Connected CFE (RTU → EES)	DR MUI	CAMS	SMS Meter Read UI
On-Peak or Seasonal Peak	Load Reduction Reported pursuant to M&V	N/A	N/A	MPV (Monthly Performance Value)	N/A
On-Peak or Seasonal Peak	DG Output Directly Metered	N/A	N/A	N/A	Hourly DG Output Hourly Load Values
RTDR	Load Reduction Reported pursuant to M&V	RT Telemetry	Data Corrections to RT Telemetry	N/A	N/A
RTDR	Load Reduction – No DG at the Asset	RT Telemetry	Data Corrections to RT Telemetry	N/A	N/A
RTDR	Load Reduction – DG used to reduce load at another on-site asset	RT Telemetry	Data Corrections to RT Telemetry	N/A	N/A
RTDR or RTEG	DG Output Directly Metered	RT Telemetry	Data Corrections to RT Telemetry	N/A	Hourly Load from Facility Billing Meter
RTEG	Load Reduction – DG Used to reduce load	RT Telemetry	Data Corrections to RT Telemetry	N/A	N/A
RTEG	DG Used to reduce load – DG used to reduce load at another on-site asset	RT Telemetry	Data Corrections to RT Telemetry	N/A	N/A

Settlement Data Submittal Deadlines

Active & Passive Data Submittal

DR Type	Metering Configuration	Load Submittal	DG Submittal	Initial Submittal Deadline	Final Submittal Deadline
On-Peak or Seasonal Peak	Load Reduction Reported pursuant to M&V	MPV (MW of Load Reduction across performance hrs)	N/A	2 ½ business days <u>after last operating day of the settlement month</u>	101st calendar day after day 1 of the month following the settlement month
On-Peak or Seasonal Peak	DG Output Directly Metered	Hourly MW from Facility Billing Meter for performance hrs	Hourly MW of DG Output for performance hours	2 ½ business days <u>after last operating day of the settlement month</u>	101st calendar day after day 1 of the month following the settlement month
RTDR	Load Reduction Reported pursuant to M&V	0	5-min Output (Load Reduction) all intervals	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month
RTDR	Load Reduction – No DG at the Asset	5-min Load all intervals	0	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month
RTDR	Load Reduction – DG used to reduce load at another on-site asset	5-min Load all intervals	5-min DG Output from on-site asset all intervals	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month



Settlement Data Submittal Deadlines

Active & Passive Data Submittal

DR Type	Metering Configuration	Load Submittal	DG Submittal	Initial Submittal Deadline	Final Submittal Deadline
RTDR or RTEG	DG Output Directly Metered	Hourly MW from Facility Billing Meter for performance hrs	5-min DG Output all intervals	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month
RTEG	Load Reduction – DG Used to reduce load	5-min Load all intervals	0	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month
RTEG	DG Used to reduce load and DG used to reduce load at another on-site asset	5-min Load all intervals	5-min DG Output from on-site asset all intervals	2 ½ business days <u>after the operating day</u>	101 st calendar day after day 1 of the month following the settlement month

Exercise: Data Submittal Deadline

Active & Passive Data Submittal Deadlines

- Objective: Learn how to use the charts on the prior slides to determine the data submittal timelines for an operating day and a settlement month
- Example Description: Using the charts on the prior slides, identify the appropriate dates for each of the following deadlines by placing an “X” and corresponding number or “MPV” on the deadline date:
 - Submittal deadline for the Passive Resource MPVs for the June 2010 Initial Settlement. 
 - RT Telemetry data correction submittal deadlines for the July Initial Settlement for the identified RTDR and RTEG dispatch days. 
Consider July 5th a non-business day

Exercise: Data Submittal Deadline

Active & Passive Data Submittal Deadlines






- Submittal deadline for the Passive Resource MPVs for June
- RT Telemetry data correction submittal deadlines for July RTDR and RTEG dispatch days

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 27, 2010	28	29	30	July 1, 2010	2 RTEG Dispatched (1)	3
4 4 th of July	5 4 th of July observed RTDR Dispatched (2)	6 RTDR Dispatched (3)	7	8 RTDR & RTEG Dispatched (4)	9	10
11	12	13	14	5	16	17

Exercise Answer Key

Active & Passive Data Submittal Deadlines

- Submittal deadline for the Passive Resource MPVs for June
- RT Telemetry data correction submittal deadlines for July RTDR and RTEG dispatch days

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 27, 2010	28	29	30	July 1, 2010	2 RTEG Dispatched (1)	3
4 4 th of July	5 4 th of July observed RTDR Dispatched (2)	6 RTDR Dispatched (3) 	7	8 RTDR & RTEG Dispatched (4)  	9 	10
11	12	13 	14	5	16	17

Dispatch Segment Exercise

Exercise: Dispatch Segments

Dispatch Segment Calculations

- Objective: Understand and be able to reproduce the calculations for some of the values in the dispatch segments
- Example Description:
 - Based on the given dispatch instructions on the next slide, calculate the missing data points in the table on the slide after that (Use the Dispatch Segment Example on the prior slides)

Exercise: Dispatch Segments

Dispatch Segment Calculations

Based on the following dispatch instructions, calculate the missing data points in the table on the next slide:

Zone	DR Type	Issue Time	Effective Time	End Time	Dispatch MW
4004	RTDR	10:30	11:00	11:15	4.000
4004	RTDR	10:45	11:15	12:05	5.000
4004	RTDR	11:35	12:05	12:20	7.000
4004	RTDR	11:50	12:20	12:45	8.000
4004	RTDR	12:45	12:45	13:15	5.000
4004	RTDR	13:15	13:15	13:15	0.000

Exercise: Dispatch Segments

Dispatch Segment Calculations

Calculate the missing data points:

Issue Time	Segment Begin Time	Segment End Time	Segment Minutes	Segment Dispatch MW	Integrated Segment Dispatch MW	H/E Dispatch MW	Interrupted MW (H/E)	Dispatch Deviation
10:30	11:00	11:15		4				
10:45	11:15	12:00		5			5.250	
	12:00	12:05						
11:35	12:05	12:20		7				
11:50	12:20	12:45		8				
12:15	12:45	13:00		5			5.750	
13:00	13:00	13:15		5			2.000	
13:15	13:15	13:15		0				

Exercise Answer Key

Dispatch Segment Calculations

Issue Time	Segment Begin Time	Segment End Time	Segment Minutes	Segment Dispatch MW	Integrated Segment Dispatch MW	H/E Dispatch MW	Interrupted MW (H/E)	Dispatch Deviation
10:30	11:00	11:15	15	4	1.000			
10:45	11:15	12:00	45	5	3.750	4.750	5.250	0.500
	12:00	12:05	5	5	0.416			
11:35	12:05	12:20	15	7	1.750			
11:50	12:20	12:45	25	8	3.333			
12:15	12:45	13:00	15	5	1.250	6.749	5.750	-0.999
13:00	13:00	13:15	15	5	1.250	1.250	2.000	0.750
13:15	13:15	13:15	0	0	0			

Baseline Calculation Details

Demand Resource Settlement Calculation

Active Resources Asset Baseline Adjustments

- An asset's baseline is adjusted on all interruption days to reflect the actual load prior to the beginning of the interruption period
- Asset Baseline Adjustments are:
 - Calculated at the asset level
 - Calculated for interruption days only
 - Calculated based on a 2 hour evaluation period, which begins 2½ hours prior to the start of the first required interruption (dispatch or DA clearing)
 - Calculated once for each interruption day:
 - For example: if there are multiple interruption events in a single day, the baseline adjustment for the day will be calculated based on the earliest interruption event in the day

Demand Resource Settlement Calculation

Active Resources Asset Baseline Adjustments (cont.)

- Rules for Applying Baseline Adjustments to an asset are:
 - If the interruption day is a result of a DA clearing or 2200 DA Forecast an asymmetrical adjustment is applied (can only increase asset's interrupted MW)
 - If the interruption day is a result of a RT dispatch, a symmetrical adjustment is applied (can increase or decrease the asset's interrupted MW)
 - If the asset's actual usage in the baseline adjustment evaluation period is $\leq 10\%$ of the unadjusted baseline for that hour, no baseline adjustment will be applied for that day
 - If there are multiple consecutive interruption days, the baseline adjustment will be calculated for each consecutive day and the adjustment that helps the asset the most will be used in that day

Demand Resource Performance Calculation Summary

Demand Resource Penalty & Incentive Rate

Penalty & Incentive Rates can be either the Adjusted FCA Category Clearing Price from the associated CCP or, when a resource CSO contains a Multi-Year Obligation (MRECO), the following:

If $SUM (MRECO \text{ CSO } MW_{Resource, Month}) > CSO \text{ MW}_{Resource, Month}$

$$Penalty \ \& \ Incentive \ Rate_{Resource, \ Month} = \frac{SUM_{Resource, \ Month} (CSO \ MW_{MRECO} \times \text{Adjusted FCA Category Clearing Price}_{MRECO \ Base \ CCP, \ MRECO \ CZ})}{SUM_{Resource, \ Month} (CSO \ MW_{MRECO})}$$

If $SUM (MRECO \text{ CSO } MW_{Resource, Month}) < CSO \text{ MW}_{Resource, Month}$

$$Penalty \ \& \ Incentive \ Rate_{Resource, \ Month} = \frac{(SUM_{Resource, \ Month} (CSO \ MW_{MRECO} \times \text{Adjusted FCA Category Clearing Price}_{MRECO \ Base \ CCP, \ MRECO \ CZ}) + SUM_{Resource, \ Month} (CSO \ MW_{Non-MRECO} \times \text{Adjusted FCA Category Clearing Price}_{CZ, \ CP})}{CSO \ MW_{Resource, \ Month}}$$

DR Performance Calculation Summary

Dispatch Segment Calculations

- Segment Minutes = Segment End Time - Segment Begin Time
- Segment Dispatch MW = from the dispatch instruction
- Integrated Segment Dispatch MW = Segment Dispatch MW x (Dispatch Instruction Segment Minutes / 60)
- H/E Dispatch MW = SUM(Integrated Segment Dispatch MW in H/E)
- Dispatch Deviation = Hourly Interrupted MW - H/E Dispatch MW

DR Performance Calculation Summary (cont.)

Interrupted MW Calculations

- Interrupted MW For assets that require a baseline = $\text{Baseline Interval} - (-1 \times \text{Actual Metered Load Interval})$
- Interrupted MW For DG assets that are directly metered = $\text{DG Output Interval}$
- Interrupted MW For assets reporting interruption pursuant to M&V Plan = $\text{AVG}(\text{Load Reduction}_{\text{Performance Hours}})$
- Interrupted MW Resource = $\text{SUM}(\text{Interrupted MW}_{\text{Assets}})$

DR Performance Calculation Summary (cont.)

Non-DRV Output Calculations

- Hourly Facility Non-DRV Output = MAX(Hourly Asset Facility Metered Load DGs at Facility)
- If Metering Configuration = “DG Same Asset,” then Hourly Asset Non-DRV Output = Total Facility Load Asset Hour
- Hourly Asset Non-DRV Output_{Asset, Performance Hour} = (DG Output_{Asset} / Total Facility Output_{Facility}) x Facility Non-DRV Output_{Facility}
- Asset Non-DRV Output_{Asset, Month} = MAX(AVG(Non-DRV Output_{Asset, Hour}), 0)
- Resource Non-DRV Output_{Resource, Month} = MIN (SUM(Non-DRV Output_{DG Based Assets, Month}, Demand Reduction Value)

DR Performance Calculation Summary (cont.)

Performance Calculations

- Hourly Performance Value = Net CSO x (1 + (Hourly Dispatch Deviation / H/E Dispatch MW))
- Monthly DRV_{Active} = AVERAGE(Hourly Performance Values_{Month})
- Monthly DRV_{Passive} = Total Load Reduction or Output_{Month} / Performance Hours
- RTDR Seasonal DRV_{When Event Hours > 0} = AVERAGE(AVERAGE(RTDR mDRV_{Seasonal Performance Months}), RTDR mDRV_{Current Month})
- RTDR Seasonal DRV_{When Event Hours = 0} = (AVERAGE(RTDR mDRV_{Seasonal Performance Months}))

DR Performance Calculation Summary (cont.)

Performance Calculations (cont.)

- RTEG Seasonal DRV_{When Event Hours > 0} = RTEG mDRV_{Current Month}
- RTEG Seasonal DRV_{When Event Hours = 0} = (Average(RTEG mDRV_{Seasonal Performance Months}))
- Passive Seasonal DRV = Average(Passive Demand Resource mDRV_{Seasonal Performance Months})
- Capacity Value Resource_{DG Based Assets} = MAX[(((DRV - Non-DRV Output) x RM Factor x T&D Loss Factor + Non-DRV Output), 0)]
- Capacity Value_{No DG Based Assets} = DRV x RM Factor x T&D Loss Factor
- Capacity Variance = Capacity Value – CSO

DR Performance Calculation Summary (cont.)

Penalty & Incentive Calculations

- Adjusted FCA Category Clearing Price = Adjusted Inflation Index Factor $_{CP}$ x FCA Clearing Price $_{CP, CZ}$
- Penalty & Incentive Rate $_{Resource, Month, MRECO MW = 0}$ = Adjusted FCA Category Clearing Price $_{CZ, CP}$
- Penalty & Incentive Rate $_{Resource, Month, MRECO MW > CSO MW}$ = $\frac{\text{SUM}_{Resource, Month} (\text{CSO MW}_{MRECO} \times \text{Adjusted FCA Category Clearing Price}_{MRECO \text{ Base CCP, MRECO CZ}})}{\text{SUM}_{Resource, Month} (\text{CSO MW}_{MRECO})}$
- Penalty & Incentive Rate $_{Resource, Month, MRECO MW < CSO MW}$ = $\frac{\text{SUM}_{Resource, Month} (\text{CSO MW}_{MRECO} \times \text{Adjusted FCA Category Clearing Price}_{MRECO \text{ Base CCP, MRECO CZ}}) + \text{SUM}_{Resource, Month} (\text{CSO MW}_{Non-MRECO}) \times \text{Adjusted FCA Category Clearing Price}_{CZ, CP}}{\text{CSO MW}_{Resource, Month}}$

DR Performance Calculation Summary (cont.)

Penalty & Incentive Calculations (cont.)

- Demand Resource Penalty \$ = Negative Capacity Variance x Penalty & Incentive Rate x 1000
- Demand Resource Incentive \$ = Positive Capacity Variance x Penalty & Incentive Rate x 1000 (limited by total penalties collected)