



EIM Customer Training



July 19, 2016



Today's Agenda

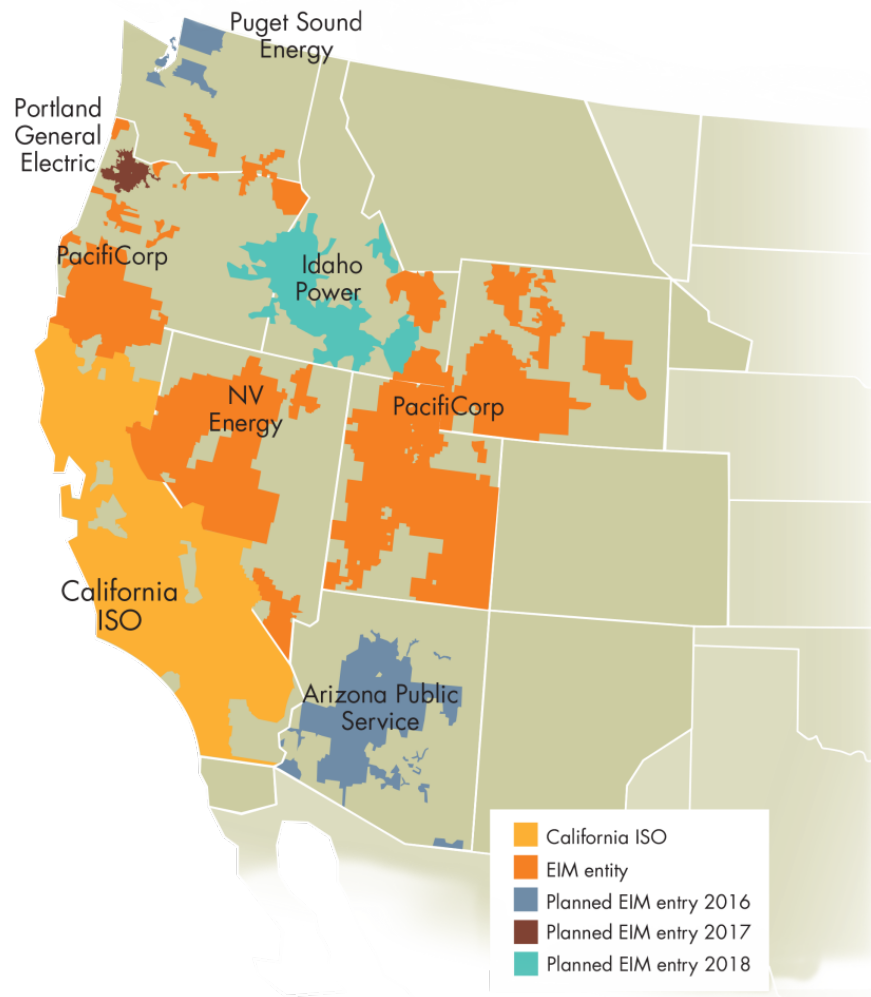
- EIM Update & Overview
- Scheduling (Tagging and Timelines)
- Outage Coordination (Transmission and Generation)
- BSAP (Only for Generation customers)



EIM Footprint Continues to Expand

Benefits are adding up:

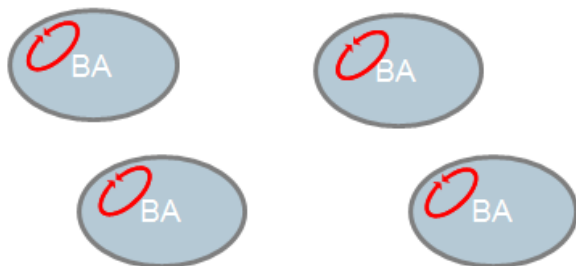
The EIM's total benefits exceed \$65 million since the western EIM began on November 1, 2014.





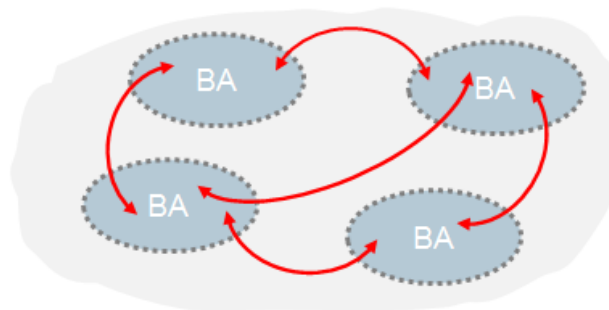
Energy Imbalance Market

Today:
Each BA must balance loads and resources w/in its borders.



- Limited pool of balancing resources
- Inflexibility
- High levels of reserves
- Economic inefficiencies
- Increased costs to integrate wind/solar

In an EIM:
The market dispatches resources across BAs to balance energy



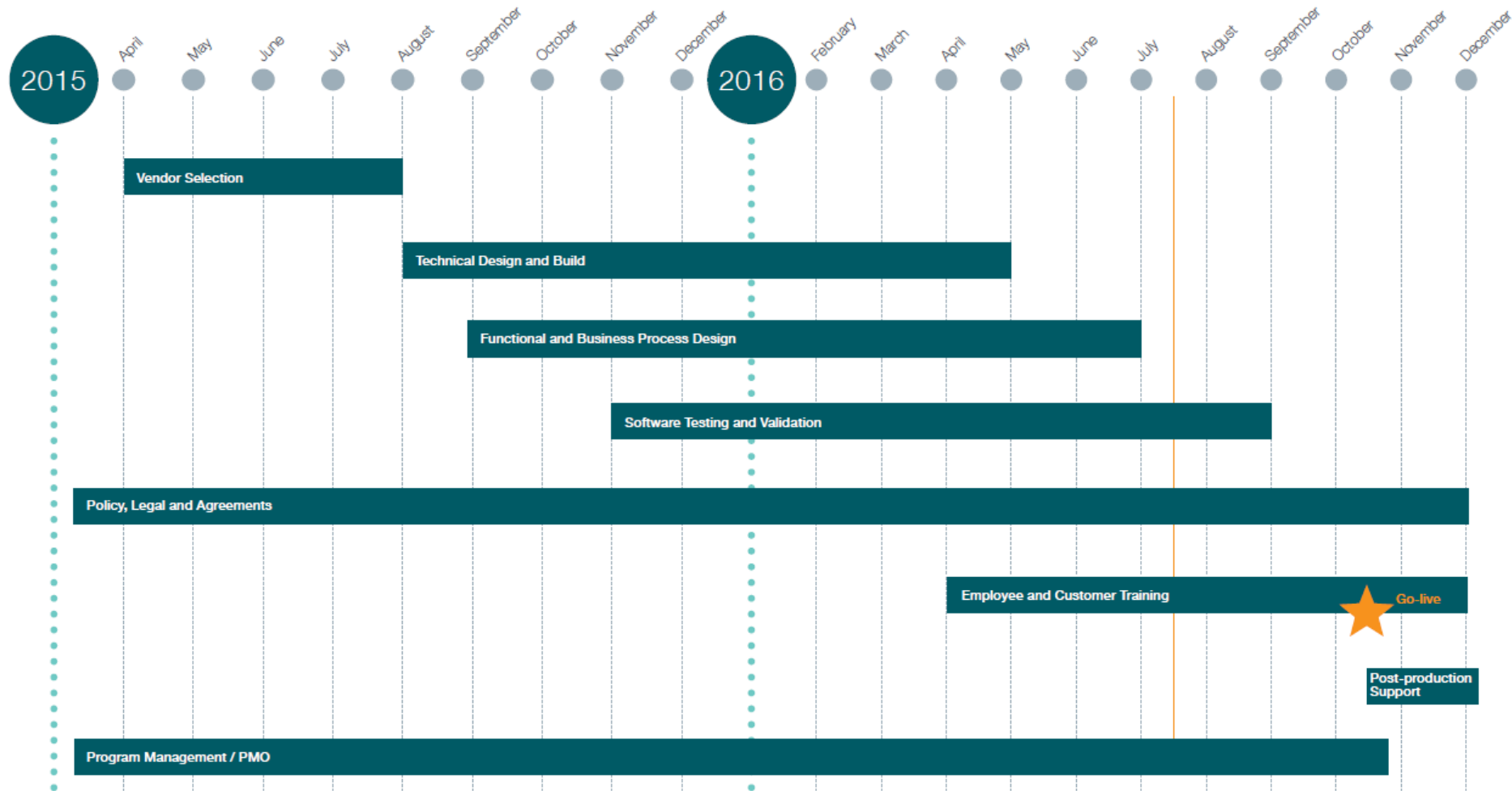
- Diversity of balancing resources
- Increased flexibility
- Decreased flexible reserves
- More economically efficient
- Decreased integration costs
- Voluntary participation



Project Timeline

EnergyImbalanceMarket

Project implementation roadmap





EIM Customer Training

Date & Time	EIM Training
Today	EIM Customer Training
September 13, 14 & 15th	Settlement Overview Webinars
Early 2017	How to Read Your Bill Webinars



Regulatory Update and Project Milestones

Open Access Transmission Tariff

- Proposed EIM Tariff Amendments February 10, 2016
 - FERC Conditional Approval of OATT April 28, 2016
 - May 27, 2016 Compliance Filing
- *Applicable Tariff Effective Date - July 25, 2016

Readiness Certification – September 1, 2016

Parallel Operations August 1 – September 30

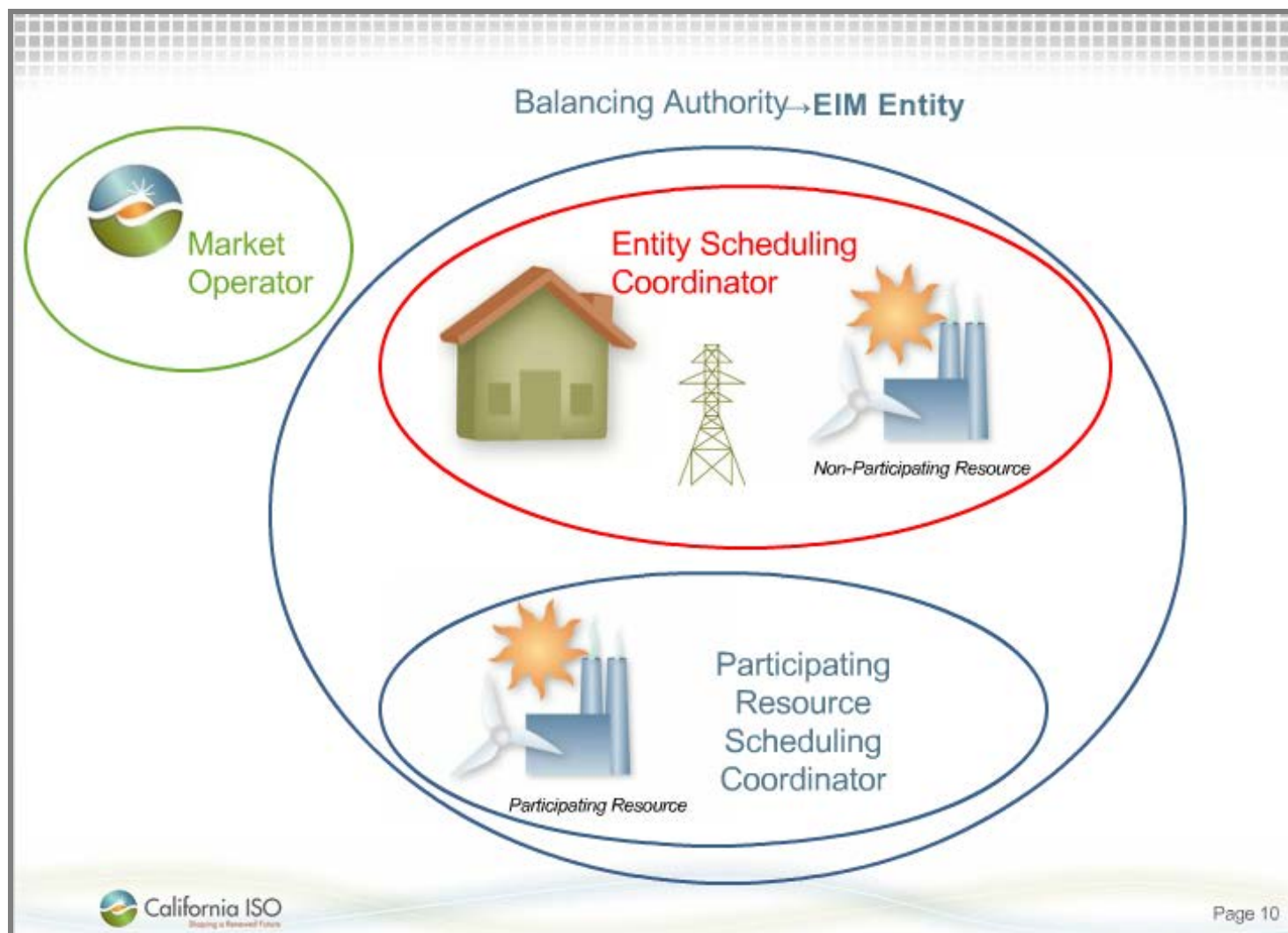
(Non Financially Binding EIM Operations)

CAISO/PSE Certify Readiness to FERC – September 1

Go Live (Financially Binding Operations) – October 1



EIM Overview





EIM Roles

EIM Market Operator (CAISO)

Runs the EIM market

Provides instruction to participating resources

Settles the imbalance market (revenue neutral)

EIM Entity (PSEI)

Balancing authority responsibilities

Transmission reliability

Coordinates and provides / arranges ancillary services

EIM Entity Scheduling Coordinator (PSEI)

Review, approve and submit resource plans

Responsible for providing balanced resource schedules to CAISO

Responsible for scheduling all non-participating resources

Responsible for settlements with CAISO

EIM Participating Resource Scheduling Coordinator

Determines and submits participating resource schedules to CAISO

Creates resource plans for BA

Submits resource offers to CAISO

Settles with CAISO and BA for charges



Background - EIM Terminology

- Participating Generators
- Base Schedules and eTags
- Disputes
- Measured Demand
- Charge Codes explained
- LAP / LMP and Losses
- Instructed Imbalance Energy
- Uninstructed Imbalance Energy



EIM Business Practice Manual

PSE's Business Practice Manual (BPM) is designed to illustrate the detailed processes and procedures necessary to comply with the provisions of Puget Sound Energy's ("PSEI") OATT" to implement the EIM.

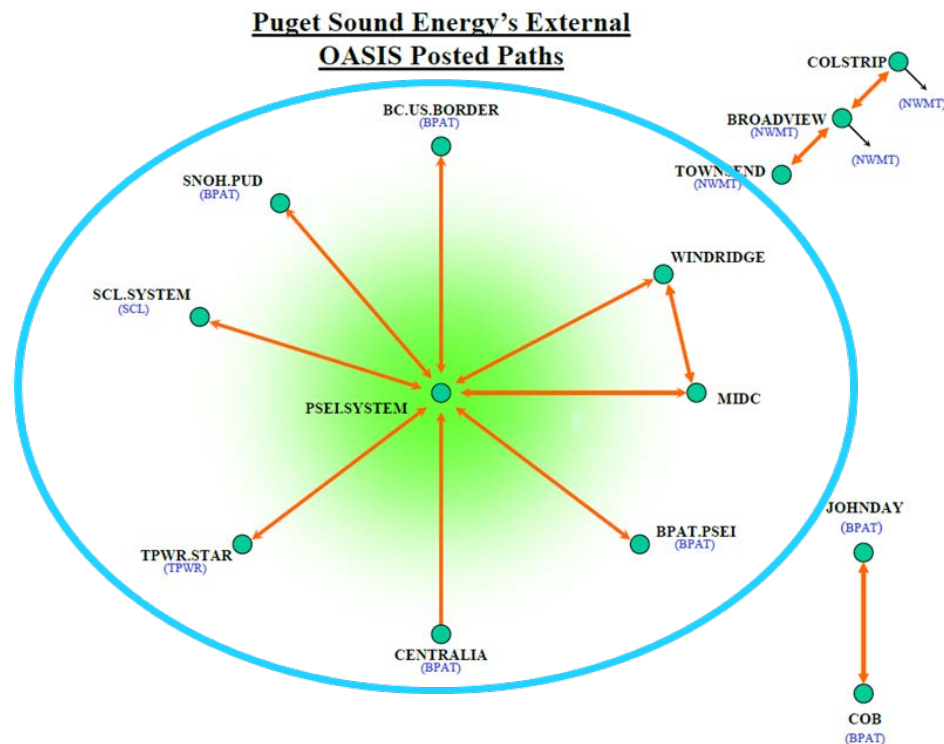
Overview of PSE EIM BPM

- Participating Resource Application, Processing, and Certification
- Registration Data Submission and Updates
- Outage Management
- Forecasting
- Settlements & Billing
- Dispute Resolution



Wheeling Customers

- Customers wheeling through PSE's BAA on it's Washington Area paths will be affected by the EIM and subject to EIM charges. This includes all scheduling points in the blue circle below.





Operational Overview

Transmission Customers provide a Base Schedule

- Preliminary Base Schedule
- Final Base Schedule – serves as the financially binding starting point for the EIM.

Transmission Customer Base Schedule - an energy schedule that provides hourly forecasts for:

- load
- resources (generation)
- interchange
- intrachange



PSE Transmission Customer Examples

Customers with a PSE EIM Participating Resources

- Puget Sound Energy (Merchant)

Customers with a Non- Participating Resources

- Puget Sound Energy (Merchant)
- March Point (Shell)
- Sierra Pacific
- Vantage

Customers with Load within PSE's Balancing Authority

- 449 Customers
- BPA Loads
- Whatcom PUD

Customers without Load or Generation in PSE's Balancing Authority

- Powerex
- Shell
- Morgan Stanley
- The Energy Authority



Base Schedules

- A base schedule, which includes eTags, is forecast information for all loads, resources, Interchange and Intrachange.
- Base schedules are due 7 days before each operating day.
- Modifications to the base schedule may be made at any time and at least one update must be provided by 10:00 AM on the day before the operating day.
- Final base schedule submitted no later than 77 minutes before each operating hour.
- Modifications to base schedule may be made up to 57 minutes before the operating hour.
- See chart on next slide for timeline.



Base Schedules for Loads and Resources - Summary

Forecast Data Type	Method of Supplying Forecast Data	Initial Submission Deadline	Update Submission Deadline	Proposed Final Submission Deadline	Final Submission Deadline
Generation Forecast Data	BSAP	T-7 days	10 a.m. before Operating Day	T-77 minutes	T-57 minutes
Interchange & Intrachange Forecast Data (Trans Customers with resources or load in PSE BAA)	E-Tags	T-7 days	10 a.m. before Operating Day	T-77 minutes	T-57 minutes
Interchange Forecast Data (Trans Customers without resources or load in PSE BAA)	E-Tags	Not applicable	Not applicable	T-77 minutes	T-57 minutes



Additional EIM Resources

- OASIS & PSE Contact Info (Link includes information on our draft EIM tariff and Business Practice Manual)
<http://www.oasis.oati.com/psei/>
- CAISO EIM Resources:
<http://www.caiso.com/informed/Pages/EIMOverview/Default.aspx>
- CAISO Business Practice Manual:
[http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Energy Imbalance Market](http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Energy%20Imbalance%20Market)



EIM Outage Coordination



Ken Finicle



Training Outline

- PSE Tariff & EIM Business Practice Language
- Generation Outages
 - In addition to the LGIA Requirements
- Transmission Outages



PSE Tariff & EIM Business Practice Language

- FERC Electric Tariff Tenth Revised Volume No. 7 of Puget Sound Energy, Inc.
 - Schedule 4, 4R & 9 Energy Imbalance Service
 - Attachment O Energy Imbalance Market
- EIM Business Practice
 - Section 6 Outages
 - 6.2 Transmission
 - Outages (Planned & Unplanned)
 - 6.3 Generation
 - Outages (Planned & Unplanned), de-rates and ramp rates changes



Outage Timing Requirements

Planned Generation and Transmission outages must be submitted by noon on Monday the week before the outage occurs.

Puget Sound Energy Outage Scheduling Timeline

1 st Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	Noon cutoff for submittal of outages for the following workweek (MON - SUN)			Noon cutoff for scheduled outage modification for the following workweek. (MON - FRI)		Outage Desk Closed	Outage Desk Closed
2 nd Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
						Outage Desk Closed	Outage Desk Closed
← Outage schedule week →							



What Defines an Outage?

Transmission

Planned - at least 45 days in advance or no later than 12:00 PM (PPT) Monday of the week prior to the planned outage.

Unplanned - as soon as possible, but no later than 30 minutes after the outage commences.

Generation

Planned - at least 45 days in advance or no later than 12:00 PM (PPT) Monday of the week prior to the planned outage.

Unplanned - Derates equal to or greater than 10MW or 5% of Pmax (whichever is greater) lasting 15 minutes or longer as soon as possible, but no later than 30 minutes after the outage commences.



PSE EIM Business Practice

- Outage Request Form
 - Transmission
 - Generation
- Submittal: Upon completion, submit to loadoffice@pse.com

CUSTOMER OUTAGE REQUEST AND REPORT FORM

PLANNED OR UNPLANNED Reset Form

Required Information *

OUTAGE TYPE *
☐ Transmission Request ☐ Generation Request ☐ Transmission Report ☐ Generation Report

CUSTOMER* EQUIPMENT/UNIT*

START DATE/TIME* DISCOVERY DATE/TIME*

END DATE/TIME*

EMERG. RETURN TIME/TYPE* REQUESTOR'S NAME*

NATURE OF WORK* CONTACT PHONE #*

SHORT DESCRIPTION*

Additional Outage Information

FORCED ☐ CAUSE CODE PRIMARY SECONDARY

CLEARANCE ☐ TERMINAL CLEARANCE ☐ HOLD ☐ INFORMATION ☐

LINE SECTION/EQUIPMENT

CLEARANCE/ISOLATION POINTS

FOREMAN TRUCK # CONTACT PHONE # PAGER #

SWITCHMAN TRUCK # CONTACT PHONE # PAGER #

SPECIAL INSTRUCTIONS

Outage Status

☐ APPROVED ☐ DENIED

APPROVED/DENIED BY CONTACT PHONE #

STATUS COMMENTS

PSE Outage Coordination (425) 882-4640
Mon - Fri 8:00 am - 1:00 pm loadoffice@pse.com Submit by Email Print Form

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- California ISO EIM webOMS
- Peak RC Coordinated Outage System (COS)

125% ▼



Transmission and Generation Outages

- EIM Participating Resource Scheduling Coordinator must submit planned generation outages.
- EIM Entity must submit planned transmission outages, in the Outage Management System (OMS) and revise these planned outages whenever their timeline or conditions change.
- Forced outages must also be submitted as soon as possible so they are considered in the EIM market dispatch.



Base Schedule Aggregation Portal [BSAP]



Hannah Jimma



Outline

- Background Information
- System Access and Navigation
- Base Schedule Submissions
- Timeframes
- Variable Energy Resources [VERs]
- How To Create a New Base Schedule or Update an Existing Base Schedule
- How to Delete or Cancel a Base Schedule
- Tips, Tricks, and Notes



Background Information

- Accepts base schedules for energy from the BSC or Entity BSC that are certified to interact with CAISO
- BSC or Entity BSC enters base schedules into BSAP for processing by other components of CAISO's management systems, using the data from the database.
- Ensures that those base schedules are valid and that the Balancing Area Authority (BAA) is reporting the balance aggregated base schedules within the BAA for the demand forecast related to the BAA for a given time period.
- Base schedules go through the CAISO "rules engine" to ensure their validity.



Base Schedule Basics

Definition

- A forward energy schedule
- Includes hourly forecasts of load, generation schedules, hourly interchange

Why

- It communicates the hourly planned operation for participating resources, non-participating resources, imports, exports & load
- Represents a financially binding starting point in the real-time market

Submitted By

- Base Schedule Coordinator
- EIM Entity Scheduling Coordinator
- Participating Resources & Non Participating Resources

Timing

- Day-ahead prior to the 10:00 am PPT the day before the operating day
- Real-time 77 minutes prior to the start of the operating hour



System Access and Navigation

- Login to the CAISO BSAP Application:
<https://portaleimmap.caiso.com/bsap>
- Link to CAISO BP:
http://www.caiso.com/Documents/BaseScheduleAggregationPortal_BSAP_UserGuide.pdf
- Each user will need a certificate to access CAISO's system. These certificates are granted per-user and installed per-machine.



System Access and Navigation: Base Schedule Display

SIEMENS BSAP

Base Schedule | BAA Bal Viewer | Resource Bal Viewer

Base Schedule > Base Schedule

Market: Real Time Scheduling Coordinator: Resource Type: Generator
BSC / Entity SC: PSEIPSE2BSC Primary Tie: [ALL]
Alternate Tie: [ALL]
PSE Identifier: [ALL]
Display Mode: [ALL]
Hour: [ALL]
Direction: [ALL]
Energy Type: [ALL]

Apply Reset

Filter Pane

Create BS

Base Schedule

HR	Resource	SC	EN	AS-RU	AS_RD	AS-SR	AS-NR	Status	Submitted
01	BRU_1_GEN1	PSE2	0.000					Valid	05/20/2016 09:32
01	BRU_1_GEN2	PSE2	0.000			55.000		Valid	05/20/2016 09:32
01	FD1_2_GEN1	PSE2	0.000					Valid	05/20/2016 09:32
01	FD2_2_GEN2	PSE2	0.000					Valid	05/20/2016 09:32
01	FD3_1_GEN3	PSE2	0.000					Valid	05/20/2016 09:32
01	FD4_1_GEN4	PSE2	0.000					Valid	05/20/2016 09:32
01	FR1_1_GEN1	PSE2	0.000				50.000	Valid	05/20/2016 09:32
01	FR2_1_GEN2	PSE2	0.000					Valid	05/20/2016 09:32
01	SMS_1_UNITS	PSE2	0.000					Valid	05/20/2016 09:32
01	WDH_2_UNIT	PSE2	269.000					Valid	05/20/2016 09:32
01	WH2_1_GEN2	PSE2	0.000				29.360	Valid	05/20/2016 09:32
01	WH3_1_GEN3	PSE2	0.000					Valid	05/20/2016 09:32
02	BRU_1_GEN1	PSE2	0.000					Valid	05/20/2016 09:32
02	BRU_1_GEN2	PSE2	0.000			55.000		Valid	05/20/2016 09:32
02	FD1_2_GEN1	PSE2	0.000					Valid	05/20/2016 09:32
02	FD2_2_GEN2	PSE2	0.000					Valid	05/20/2016 09:32
02	FD3_1_GEN3	PSE2	0.000					Valid	05/20/2016 09:32

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Message Viewer

Rule#	Level	Message
30039	6	The EIM Entity SC of the EIM Entity of the EIM BAA of a Registered Resource specified in a valid Base Schedule
30040	6	The Base Schedule Coordinator authorized to submit Base Schedules for the Resource and Base Schedule F

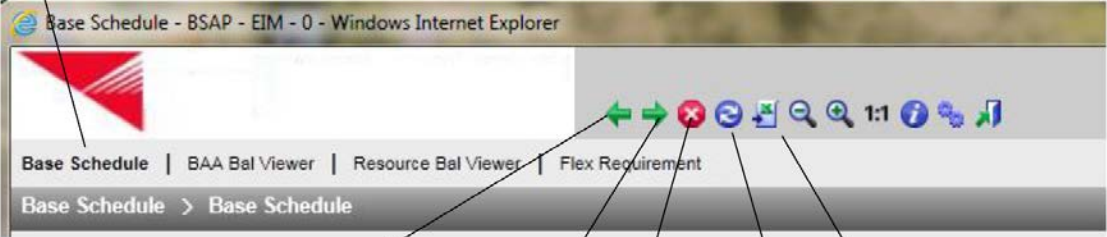
Messages

Data Grid

System Access and Navigation: Application Menu and Tabular Grid

Selection Tab

Figure 1: BSAP Application Menu



Previous
Page





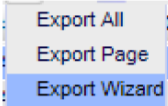

Next Page

Stop Page
Loading

Refresh
Page

Export
Page



	This is the 'Edit' icon used to edit a selected set of rows.
	Restore Default Sort. It is possible to change the sort order of the contents of a tabular display by clicking on the title row. Clicking on the Restore Default Sort button restores the sort order to the default, that is, it removes any sorting that has been established by clicking on title rows.
	This is an inline filter icon, allowing to only display data that matches the inline filter criteria.
	This is used to export the contents of the data grid in
	Export All – all data grid items. Export Page – data on page. Export Wizard – will allow selection for Excel, csv or Word. And by column header.
	Print. This button prints the contents of the grid.



Base Schedule Submissions

Day Ahead to T-57 Base Schedule Submission:

- **Executed By:** Energy Trader (Day-Ahead), Energy Trader (Real-Time), 3rd Party Generation Resources / Agents, and Energy Schedulers
 - Enter in Base schedules and submit energy bids to balance within 1% of CAISO's forecast load.
 - Execute transactions to balance within 1% of CAISO's forecast load.
 - Submit bilateral transaction e-tags.

T-55 to T-40 Base Schedule Submission:

- **Executed By:** Load Office EIM Desk [EIM Entity]
 - Review Sufficiency test results and re-balance (if necessary) to be within 1% of CAISO's forecast load and take into consideration 3rd party tags and base schedules by T-40.

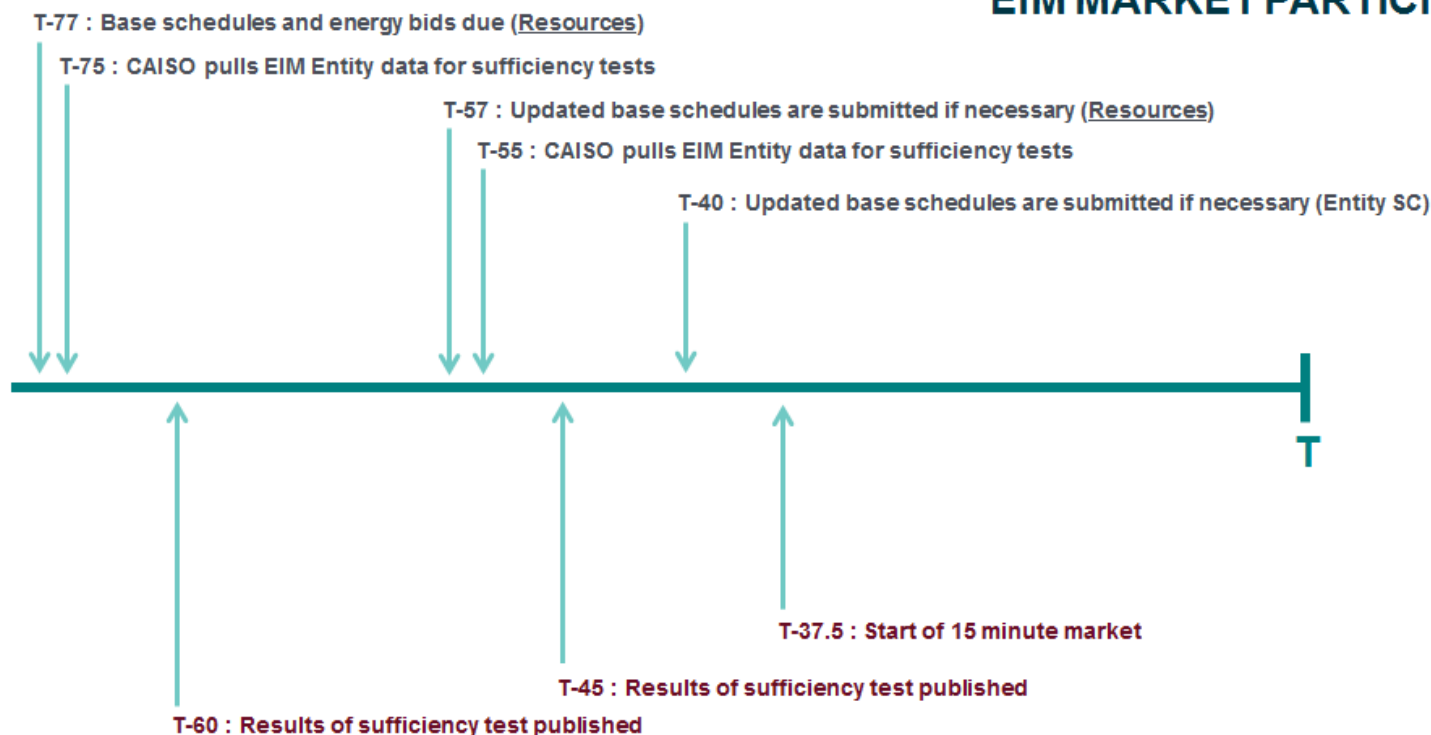


Timeframes

PSEIMARCBSC: March Point / PSEISAWMBSC: Sierra Pacific / PSEIVANTBSC: Vantage

- These BSC's are valid for creating and updating base schedules prior to the T-55 sufficiency test (required by T-57) and for future timeframes past the upcoming interval T.
- Scheduling Coordinator: PUG1

EIM MARKET PARTICIPANTS



MARKET OPERATOR



Variable Energy Resources [VERs]

- VERs must also submit a base schedule and tag for the energy by 57 minutes before the operating hour [T-57]
- Separately, CAISO has a requirement to provide five minute forecast data for a three-hour minimum period which CAISO will use for consideration when running market optimizations for future intervals.





CREATE A NEW BASE SCHEDULE OR UPDATE AN EXISTING BASE SCHEDULE



Creating A New Base Schedule

1. Under “Market” select “Real-Time”
2. Select the appropriate BCS/Entity SC from the drop down menu
3. Enter in the date you wish to schedule by clicking on the calendar icon, or by manually typing in the date (MM/DD/YYYY)
4. Enter in the appropriate scheduling coordinator (free form text)
5. Enter in the Resource type from the drop down
 - Resource Type: Generator → select the resource from the “Resource” drop down
6. Optional: Select the Hour for which you would like to schedule. If you do not select a particular hour, a grid for a 24 hour period of the selected date will appear after executing step 7 below.
7. Select “Apply” at the top right side of the base schedule filter pane

Base Schedule > Base Schedule

Market:	<input type="text" value="Real Time"/>	Scheduling Coordinator:	<input type="text" value="PSE2"/>	<input type="button" value="Apply"/> <input type="button" value="Reset"/>
BSC / Entity SC:	<input type="text" value="PSEIPSE2BSC"/>	Resource Type:	<input type="text" value="Generator"/>	
		Scheduling Point:	<input type="text" value="[ALL]"/>	
		Primary Tie:	<input type="text" value="[ALL]"/>	
		Alternate Tie:	<input type="text" value="[ALL]"/>	
		PSE Identifier:	<input type="text"/>	
		Display Mode:	<input type="text" value="[ALL]"/>	
	<input type="text" value="08/13/2016"/>			



Creating A New Base Schedule

8. Select “Create BS” [it should create a new line]

HR	Resource	SC	EN	AS-RU	AS_RD	AS-SR	AS-NR	Status	Submitted
01	BRU_1_GEN1	PSE2						Created	
01	BRU_1_GEN1	PSE2	0.000	53.040		1.960		Valid	06/12/2016 13:45
02	BRU_1_GEN1	PSE2						Created	
02	BRU_1_GEN1	PSE2	0.000	53.040		1.960		Valid	06/12/2016 13:45
03	BRU_1_GEN1	PSE2						Created	

9. Enter in the EN (energy)

10. Select “Update”

11. Right-click on new value and select “Submit BS”

HR	Resource	SC	EN	AS-RU	AS_RD	AS-SR	AS-NR	Status	Submitted
01	BRU_1_GEN1	PSE2	35.000					Valid	
01	BRU_1_GEN1	PSE2	0.000			1.960		Created	06/12/2016 13:45
02	BRU_1_GEN1	PSE2						Created	
02	BRU_1_GEN1	PSE2	0.000			1.960		Valid	06/12/2016 13:45
03	BRU_1_GEN1	PSE2						Created	
03	BRU_1_GEN1	PSE2	0.000			1.960		Valid	06/12/2016 13:45
04	BRU_1_GEN1	PSE2						Created	
04	BRU_1_GEN1	PSE2	0.000			1.960		Valid	06/12/2016 13:45
05	BRU_1_GEN1	PSE2						Created	
05	BRU_1_GEN1	PSE2	0.000	53.040		1.960		Valid	06/12/2016 13:45

12. The new value should remain with a status updated from “Created” to “Valid”

Note: If your base schedule has a status of “Invalid” or “Rejected”, check the Message Viewer pane to see a description of the error.



DELETE OR CANCEL A BASE SCHEDULE

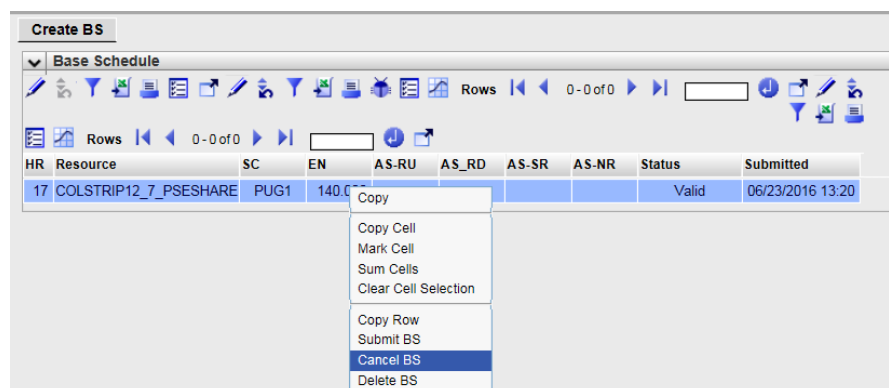


Delete or Cancel A Base Schedule

A base schedule cannot be canceled for a market that has closed. Base schedules can only be canceled for markets that are still open, and for base schedule that are not invalid, rejected or in submit status. Base schedules with these statuses can be deleted.

Valid Base Schedules:

- Highlight each row of a base schedule to be canceled.
- Right click and select the “Cancel BS” menu item. This will remove the base schedule(s) from consideration by the system



Invalid/Rejected Base Schedules:

- Highlight each row of a base schedule to be deleted.
- Right click and select the “Delete BS” menu item. This will remove the base schedule(s) from consideration by the system



Tips, Tricks, and Notes

- Editing an existing base schedule is completed by following the same steps as creating a new base schedule.
- Change the “Display mode to “View Latest Submitted Base Schedules” to eliminate looking at rows for each hour with lines showing Valid and Created base schedules

Base Schedule									
HR	Resource	SC	EN	AS-RU	AS_RD	AS-SR	AS-NR	Status	Submitted
01	COLSTRIP12_7_PSESHARE	PUG1	194.000					Valid	07/18/2016 10:37
02	COLSTRIP12_7_PSESHARE	PUG1						Created	
02	COLSTRIP12_7_PSESHARE	PUG1	193.000					Valid	07/18/2016 09:30
03	COLSTRIP12_7_PSESHARE	PUG1						Created	
03	COLSTRIP12_7_PSESHARE	PUG1	193.000					Valid	07/18/2016 09:30

Base Schedule > Base Schedule

Market:

Scheduling Coordinator:

Resource:

Resource:

BSC / Entity SC:

Scheduling Point:

Hour:

Primary Tie:

Direction:

Alternate Tie:

Energy Type:

PSE Identifier:

Display Mode:

View Edited Base Schedule(s)

View Latest Submitted Base Schedule(s)

Apply

Reset

Base Schedule									
HR	Resource	SC	EN	AS-RU	AS_RD	AS-SR	AS-NR	Status	Submitted
01	COLSTRIP12_7_PSESHARE	PUG1	194.000					Valid	07/18/2016 10:37
02	COLSTRIP12_7_PSESHARE	PUG1	193.000					Valid	07/18/2016 09:30
03	COLSTRIP12_7_PSESHARE	PUG1	193.000					Valid	07/18/2016 09:30



Tips, Tricks, and Notes [continued]

- Input accelerators allow you to quickly replicate duplicate data on a table. This can be completed from using Hot Keys or Right-Click Menu Options.

- Hot Keys:**
 - Hot Keys: When you want to copy the data from the current cell into all of the cells above or below, using the Alt + Up or Alt + Down commands is a fast way to do just that.

Alt + Up/Down Commands



- Right-Click Menu Options:** When the sheet is in edit mode, you have options to use the following functions:

EN	AS-RU	AS_RD	AS-SR	AS-NR	Status
26.000					Created
26.000					Created
26.000					Created
26.000					Created
26.0	Copy				Created
26.0	Paste				Created
26.0	Set all values in column to this value				Created
26.0	Copy Cell				Created
27.0	Paste Cell				Created
26.0	Paste Cell Through				Created
26.0	Mark Cell				Created
26.0	Sum Cells				Created
26.0	Clear Cell Selection				Created
26.0	Copy Row				Created
26.0	Paste Row				Created
26.0	Paste Row Through				Created
26.0	Update				Created
26.0	Cancel				Created

- Set all values in column to this value: While in edit mode and having the selected row with the value, will copy that value for the entire column.
- Copy/Copy Cell/ Mark Cell: Copies or marks the contents of the selected cell or row
- Paste/ Paste Cell: Pastes the copied row into the currently selected row
- Paste Cell Through: Pastes the copied cell into all the cells up or down through the selected cell
- Paste Row Through: Pastes the copied row into all the rows up or down through the selected row
- Paste Cell Through: Pastes the copied cell into all the cells up or down through the selected cell
- Paste Row Through: Pastes the copied row into all the rows up or down through the selected row
- Copy Row: Copies the row
- Paste Row/Paste Row Through: Paste the copied row into the selected row or through the selected row.
- Update: Updates the grid and exits the edit mode.
- Cancel: Cancels the last action and exits the edit mode.



QUESTIONS?
EMAIL EIM@PSE.COM