





PGE EIM OATT Stakeholder Meeting January 12, 2017





Welcome and Introductions

Frank Afranji



Today's Meeting



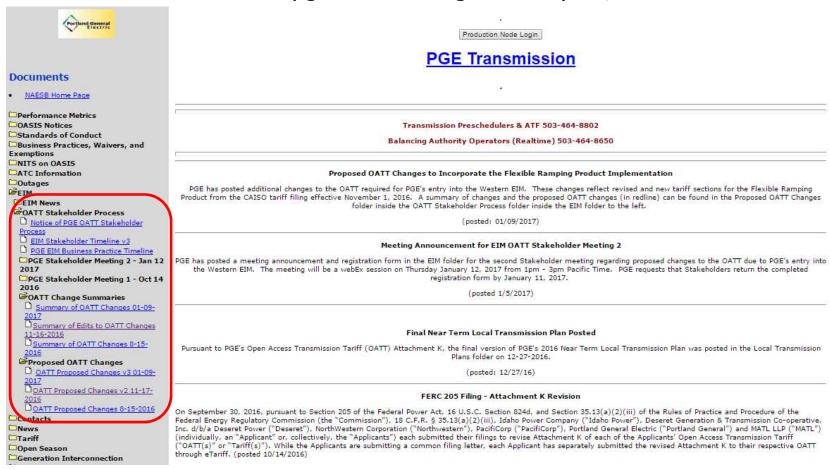
Meeting Objective: To provide information about how the EIM will impact PGE transmission customers and what you should expect.

- Introductions and welcome
- Opportunities for Stakeholder input
 - Process for Business Practice Review
- Key Elements of the EIM Tariff Structure
- Tariff Revisions and CAISO Market Context
- Business Practice Preview
- EIM Implementation Update
- Wrap up

Reminder: Stakeholder Comments and Questions



Comments or questions about PGE's proposed OATT modifications or about today's presentations can be submitted to TransmissionProvider@pgn.com through January 23, 2017.



Stakeholder Meeting Approach



- We are looking forward to your questions and customer dialogue during today's meeting.
- We will answer questions to the extent that we are able during the call.
- We will document all questions received and provide written responses posted to OASIS by February 6th.
- We encourage stakeholders to submit any questions to <u>transmissionprovider@pgn.com</u> to ensure they are accurately documented.

OATT Stakeholder Timeline



Activity	Target Date
Announcement of Stakeholder Process	July 15, 2016
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PGE EIM Business Practice Timeline



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PGE Implementation: Stakeholder Engagement



We want to engage with our customers regarding **Engage** changes We will seek to inform our customers and to provide **Inform** information on how this transition will impact operations Input from customers on these changes and the **Input** stakeholder process We will look to make refinements to improve our process Refine or tariff wherever possible, within CAISO tariff limitations We want customers to benefit from EIM. Your **Benefit** understanding of these changes will help prepare for this new operational model



Questions?



Key Elements of the EIM Tariff Structure

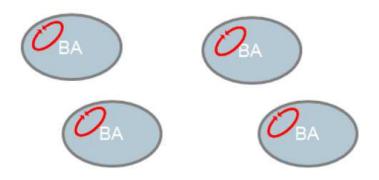
Pam Sporborg, PGE

Review—What is an EIM?



Today:

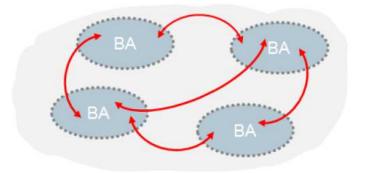
Each Balancing Authority (BA) must balance loads and resources w/in its borders.



- Limited pool of balancing resources
- Inflexibility
- Economic inefficiencies

In an EIM:

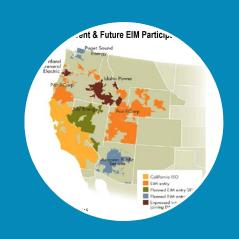
The market dispatches resources across BAs to balance energy.



- Diversity of balancing resources
- Increased flexibility
- More economically efficient
- Voluntary participation

Why PGE Decided to Join the Western EIM





reliability

It does so by spreading the burden of balancing wind, solar, & load across a more diverse footprint.



EIM reduces customer costs

Expected annual power cost savings of \$3.5 million and beyond, starting in 2020, as more renewables are added to the system.



EIM supports a renewable future

EIM contributes to PGE's ability to fully "self-integrate" its wind, instead of paying BPA for the balancing service.

EIM is good for Reliability, Customers, & Renewables

PGE Preparations for EIM Participation



- Regulatory Revisions in 2017
 - Open Access Transmission Tariff to be filed with FERC
 - Change of Status for Market-Based Rate Authority to be filed with FERC
- IT Systems Integration for Market Participation
 - Resource Data Templates provide operational characteristics for Participating Resources
 - Forecast Data and Outage submission
 - CAISO settlements
- New Business Practices
 - Draft PGE EIM Business Practice posted on OASIS



Questions?



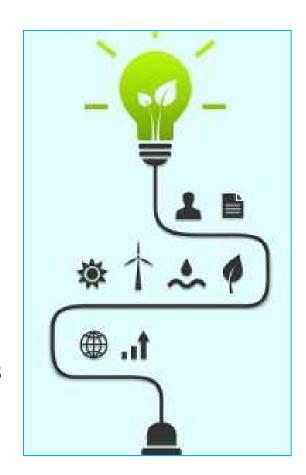
Tariff revisions and CAISO Market Context

Don Light

Tariff Principles



- Listen to our customers: We encourage customers to provide written comments on the proposed OATT revisions. Customers can also request a customer meeting to address specific questions on their transmission service.
- Meet Regulatory Requirements: Ensure just and reasonable treatment for all customers.
- Rely on Precedent: Four other utilities have previously completed this implementation process, successfully entering the Western EIM over the last two years. Each of PGE's proposed OATT revisions is based on language that FERC has previously approved in other EIM Entity OATT filings.



Background—EIM OATT Revisions



- Most EIM changes related to PGE's participation in the Western EIM are contained in the new **Attachment P** to our OATT
 - Other key changes are located in:
 - Part I: Definitions
 - Schedule 1A: EIM Administrative Fees
 - Schedules 4, 4R, and 10: Imbalance Services
 - Schedule 11: Losses



Round 1 Stakeholder Comments

- Round 1 Comment Period: August 15- November 1, 2016
- PGE did not receive any Stakeholder comments

Round 1 OATT Revisions

- Corrected references in sections 1.11B, 1.14B, 1.34, Schedule 4R, Attachment M 5.1, Attachment P 4.2.4
- Provided clarifying edits to Attachment P, Section 3.3.1 by inserting the phrase "to register a resource" to make clear that an applicant must register each resource individually as a PGE EIM Participating Resource



Flexible Ramping Product OATT Revisions

- PGE is proposing changes to align with CAISO tariff changes to implement the Flexible Ramping Product that took effect November 1, 2016
- Specific changes are listed in the matrix of changes on OASIS

Round 2 Stakeholder Comments

- Please provide comments by January 23
- PGE will post responses to all comments and questions by February 6

Anticipated EIM Design Changes





The Western Energy Imbalance Market continues to be refined in response to changing market conditions, technological advances, and regulatory requirements.

Initiatives that may impact the EIM market design in 2017:

- EIM Greenhouse Gas Compliance
- Real-time Market Enhancements
- Management of EIM Imbalance Settlement for Bilateral Schedule Changes

All stakeholders have an opportunity to provide input into the CAISO process. Information on these initiatives can be found at: http://www.caiso.com/informed/Pages/StakeholderProcesses/Default.aspx



EIM Customer Impacts

John Walker and Pam Sporborg, PGE

Background: Key Roles in the EIM



Operator (CAISO)

Operates the EIM market

Provides dispatch instructions to participating resources

Settles the imbalance market

Conducts market monitoring and oversight

EIM Entity

Balancing Authority

Transmission Reliability

Coordinates and provides ancillary services

EIM Transmission Service Provider

Controls Transmission in the EIM Entity BAA

Makes Transmission Service available to the EIM

EIM Participating Resource Scheduling Coordinator

Determines and submits participating resource schedules to the CAISO

Creates a resource plan for the BA

Submits resource bid ranges to the CAISO

Settles with CAISO and BA for charges



Generating customers have a choice:

Participating Resources are:

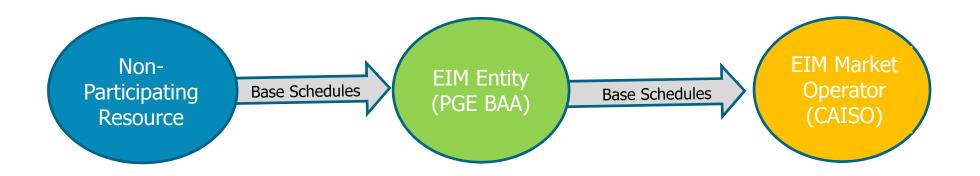
 Generators either internal or pseudo-tied to PGE's Balancing Authority Area (BAA) that can bid into the market to be dispatched by the CAISO EIM to provide imbalance energy on a five-minute basis.

Non-Participating Resources are:

 Generators in PGE's BAA that will not bid into the EIM. These generators will still be impacted by changes to metering, scheduling, and settlement.

Non-Participating Resource Example

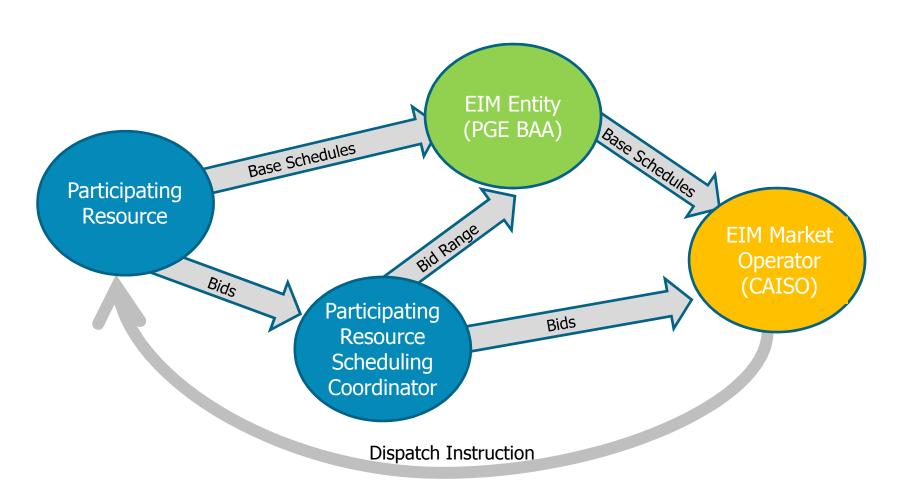




Non-Participating Resource customers will maintain their relationship with PGE

Participating Resource Example





Participating Resource customers have a direct relationship with both CAISO and PGE

What does it mean to be a Participating or Non-Participating Resource?



	Today	EIM Participating Resource (PR)	EIM Non- Participating Resource (NPR)
Metering	15-minute metering capability	5-minute metering capability	5-minute metering capability
Scheduling	E-tag	Base Schedules + E-tag	Base Schedules + E-tag
Generation Outage Coordination	Generator operators must call the System Control Center to report forced outages	Generator owners must report forced outages or de-rates to the EIM Entity within 30 minutes	Generator owners must report forced outages or de-rates to the EIM Entity within 30 minutes
Settlements Calculations	PGE sends settlements statements at Mid-C hourly index price published by Powerdex	CAISO will settle directly with PRs at Locational Marginal Prices (LMP)	PGE will settle with NPRs at LMP prices
Imbalance Charges Bill Frequency	Monthly	Weekly	Weekly. PGE anticipates providing advisory information on a daily basis

Interchange vs. Intrachange

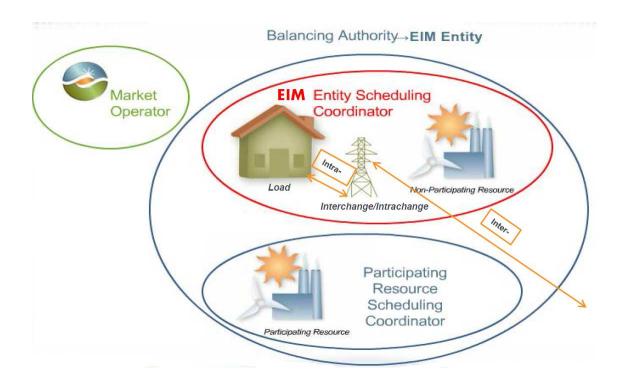


Interchange

 E-Tagged energy transfers from, to, or through the PGE BAA or other BAAs, not including EIM Transfers.

Intrachange

 E-Tagged energy transfers within the PGE BAA, not including real-time actual energy flows associated with EIM Dispatch Instructions.



Load Example



Load Serving Entities (LSEs) without Participating Resources in PGE's BAA do not have a direct relationship with CAISO.

LSEs must submit their Interchange and Intrachange via e-Tag, which is their Transmission Customer Base Schedule.

PGE calculates the load component of the Transmission Customer Base Schedule as:

Base Schedule for Load = Forecast Generation + Interchange + Intrachange

If a customer with load in the PGE BAA does not own any generation in PGE's BAA, its Transmission Customer Base Schedule for load is the sum of the submitted e-tags at T-57 sinking at its load.

The Transmission Customer Base Schedule for load is the baseline from which load imbalance is calculated and sub-allocated.

What does EIM Mean for Load Customers?

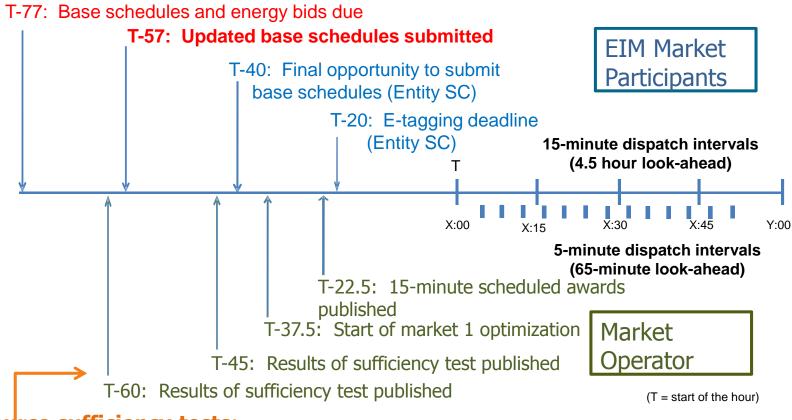


	Today	EIM
Metering	15 or 60 minute metering	No Change
Scheduling	E-Tag	E-Tag, subject to additional imbalance charges if E-Tags are submitted or adjusted after T-57
Settlements Calculations	Mid-C index hourly prices	LAP Hourly Prices
Imbalance Charges Bill Frequency	Monthly	Weekly. PGE anticipates providing advisory information on a daily basis.

Scheduling Timelines



After advisory feedback period, final submission of hourly base schedules is interactive



Resource sufficiency tests:

Balanced load and generation? Free of congestion? Sufficient generating capacity? Sufficient ramping capability?

EIM Scheduling Timelines for Transmission Customers



Forecast Submittal

- Forecast submittals for service are required beginning 7 days before the operating day
- Must update forecast at least once by ten am on the day before the operating day
- Forecasts serve to support market functions but are not financially binding until base schedule submission

Base Schedule Submittal

- Base schedules are submitted at 77 minutes before the operating hour.
- Base schedules can be modified up to 57 minutes before the operating hour
- Base schedules serve multiple market functions

Adjustments After Base Schedule Submittal

 Transmission customers have full access to purchased transmission rights past base schedule submission; however, modifications settle as imbalance at the applicable LMP

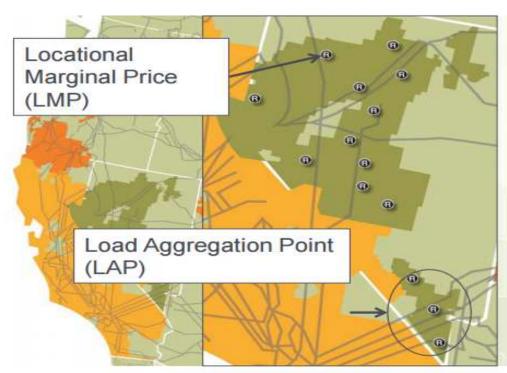
EIM Provides More Precise Imbalance Settlement



<u>Today</u>: Imbalance is settled at the **Mid-C hourly index price** and penalty tiers are applied

<u>In the EIM</u>: Generation and E-Tag changes settle at a **5-minute and 15-minute LMP**

Load changes settle at an **hourly** LAP. PGE will have a single LAP.



These examples are not meant to reflect actual resource or load locations



Locational Marginal Price (LMP)

 The marginal cost (\$/MWh) of serving the next increment of demand at a specific node consistent with existing transmission constraints and the performance characteristics of resources.

Load Aggregation Point (LAP)

 The hourly weighted average of all LMPs within the PGE BAA.

Components of Locational Marginal Pricing



Locational Marginal Price (LMP)

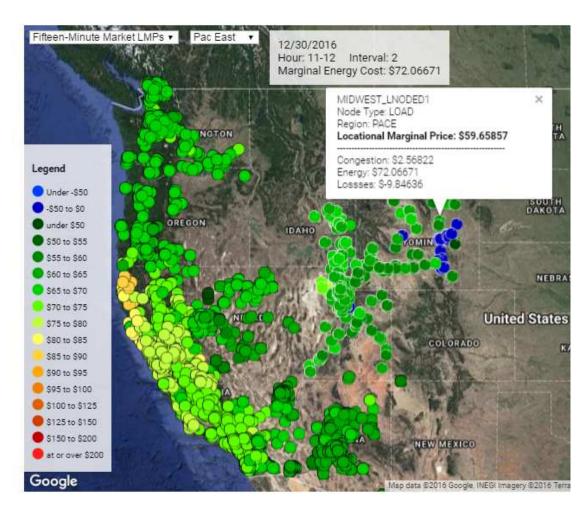
The marginal cost of serving the next increment of demand at a particular node, consistent with transmission constraints.

LMP prices consist of three components:

Energy + Congestion + Losses

Note: A greenhouse gas component applies to participating resources.

Source: CAISO posts real-time prices to the CAISO OASIS and to the CAISO Market Price Map, available at: http://www.caiso.com/pages/pricemaps.a spx



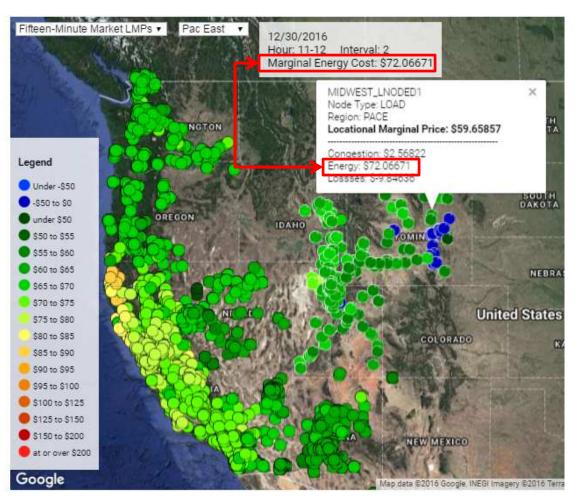
Components of Locational Marginal Pricing



System Marginal Energy Cost Component

The System Marginal Energy Cost is the cost of economically providing the next increment of energy for the entire market footprint, based on submitted

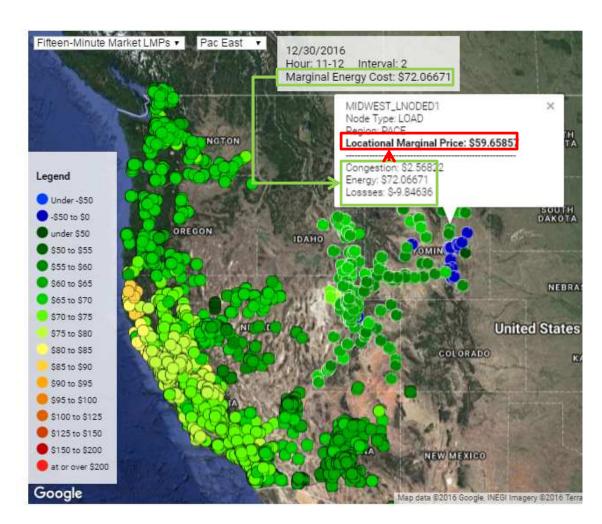
bids



Components of Locational Marginal Pricing



Energy + Congestion + Losses = LMP
$$$72.07 + ($2.57) + ($9.85) = $59.65$$



Changes to Losses Settlements



Existing Losses Settlement

- Scheduled energy
- In-kind energy loss returns only

Proposed Losses Settlement

- Financial settlement only
- Scheduled energy at base schedules
- Losses settled at LAP Price

Loss component settles as part of imbalance after base schedules

Transmission Losses in EIM



LAP or LMP: \$20/MWh

Loss component: \$0.50/MWh

2 MWh Imbalance Energy price: Loss component of LAP for load, of LMP for resources and e-tags Imbalance settlement: 2 MWh x \$20 = \$40 <u>Embedded</u> Loss Settlement: 2 MWh x \$0.50 = \$1

Base Schedule 5MWh

Energy price: LAP loss factor: 1.6% PGE System Loss Factor

Financial Loss Settlement: 5 MWh x 1.6% x \$20 = \$1.60

Loss Compensation on CA-OR Intertie and Colstrip



- PGE requires loss compensation over the PGE-owned portion of the California-Oregon Intertie (COI) and Colstrip transmission systems.
- Therefore, the use of LAP (EIM) pricing as the cost of energy for loss compensation over these facilities is accurate.
- This approach is consistent with other EIM Entities and FERC precedent. FERC
 has directed previous EIM entrants to financially settle losses for transmission
 customers at LAP prices.
- Losses on the COI (2%) and Colstrip (3%)= Final E-Tag MWh * Loss % * Hourly I AP



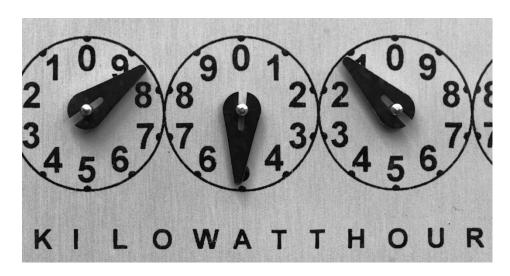


Measured Demand

 Metered demand plus export volumes from PGE Balancing Authority Area.

Metered Demand

 Metered load volumes in PGE's Balancing Authority Area.



Flexible Ramping Product Overview



- Allows the market to manage upward and downward ramping capability across the EIM footprint
- Compensates resources who provide ramping and charges those that consume ramping capability
- Aligns cost allocation with those who benefit from additional ramping capability to meet net load uncertainty

Flexible Ramping Product



- Only Participating Resources can receive Flexible Ramping Product awards.
- There is no separate bid for Flexible Ramping Product; it is a component of a Participating Resource's energy bid.
- The EIM will award Flexible Ramping based on the resource's capability to ramp in excess of its forecasted movement.
- The Flexible Ramping Product will compensate resources based on the marginal opportunity cost of not being awarded economic energy dispatch.
- Each EIM Entity must pass both an upward and downward ramping test as part of the resource sufficiency requirement.



Description	Allocation
Flexible Ramping Forecasted Movement (Resource Settlement)	Measured Demand
Flexible Ramping Forecasted Movement (Demand Allocation)	Metered Demand
Daily Flexible Ramping Uncertainty Award (in both upward and downward directions)	Measured Demand
Monthly Flexible Ramping Uncertainty Award (in both upward and downward directions)	Measured Demand
Any other Flexible Ramping Product Charges or Payments	Measured Demand

Note: Payments for FRP awards will be settled directly with the Participating Resource



Questions?



PGE EIM Business Practice Preview

John Walker, PGE

PGE EIM Business Practice Overview



- The PGE EIM Business Practices document the detailed processes and procedures necessary to comply with the provisions of the PGE OATT to implement the EIM.
- To the extent an inconsistency may exist between the EIM BP and the PGE OATT, the PGE OATT shall govern.
- The EIM BP will apply to all Transmission Customers and Interconnection Customers, as applicable with new and existing service agreements, as well as all transmission customers with legacy transmission agreements that expressly incorporate by reference the applicability of PGE's OATT.
- The EIM BP does not apply to General Transfer Agreement (GTA) customers.

PGE EIM Business Practices



Generating Resources:

 All generating resources in the PGE BAA must complete the registration requirements detailed in the PGE EIM Business Practices

Outage Notifications

- PGE must not only coordinate outages for existing reliability requirements, but must also notify the market operator of all planned and unplanned outages for both transmission and generation.
- Detailed specifications for planned and unplanned outages for both transmission and generation are addressed in the PGE EIM Business Practices

Forecasting

- Forecast information for generation, interchange, intrachange, and VERs are required for market operations.
- Forecast requirements and submittal information are detailed in the PGE EIM Business Practices

Settlements and Billing

 The PGE EIM Business Practices documents the billing determinants and allocation methodologies for each charge code that the EIM Entity will receive from CAISO



Questions?



Stakeholder Next Steps

Don Light, PGE

PGE Implementation Milestones





Key Implementation Milestones

- Stakeholder Process and Input
- Tariff Changes
- Data Requirements, Operational Systems & Business Practices
- Parallel Operation, Simulation & Go Live
- Settlement



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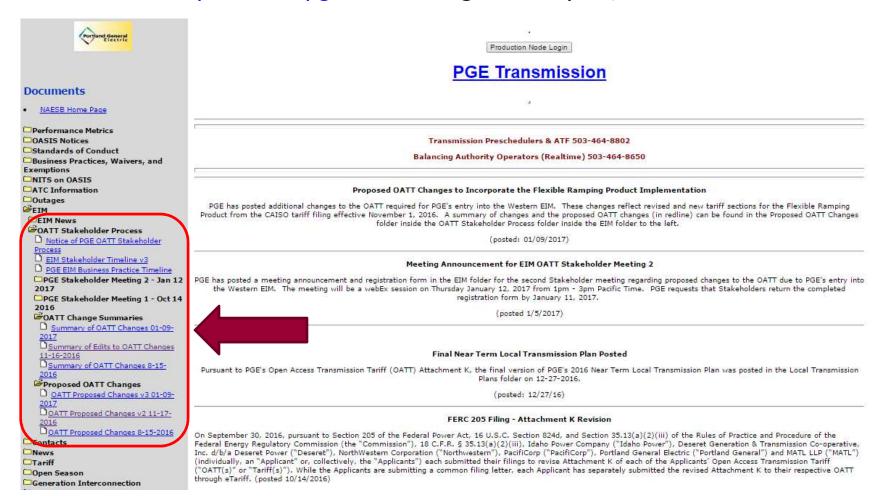


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CAISO EIM Resources



CBT - Introduction to the Energy Imbalance Market

This Computer Based Training provides a high level overview of the Energy Imbalance Market

http://content.caiso.com/training/Introduction%20to%20EIM/My%20Articulate%20Projects/Introduction%20to%20the%20Energy%20Imbalance%20Market/player.html

CBT - How the Energy Imbalance Market Works –

This Computer Based Training describes the roles and responsibilities of the key players in EIM and the business processes that will take place.

http://content.caiso.com/training/HowEIMWorks/player.html

EIM Stakeholder processes and tariff filings

http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarket.aspx

EIM Business Practice Manual

http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Energy Imbalance Market



Questions?