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# EnergyImbalanceMarket

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Puget Sound Energy  
October 18, 2016

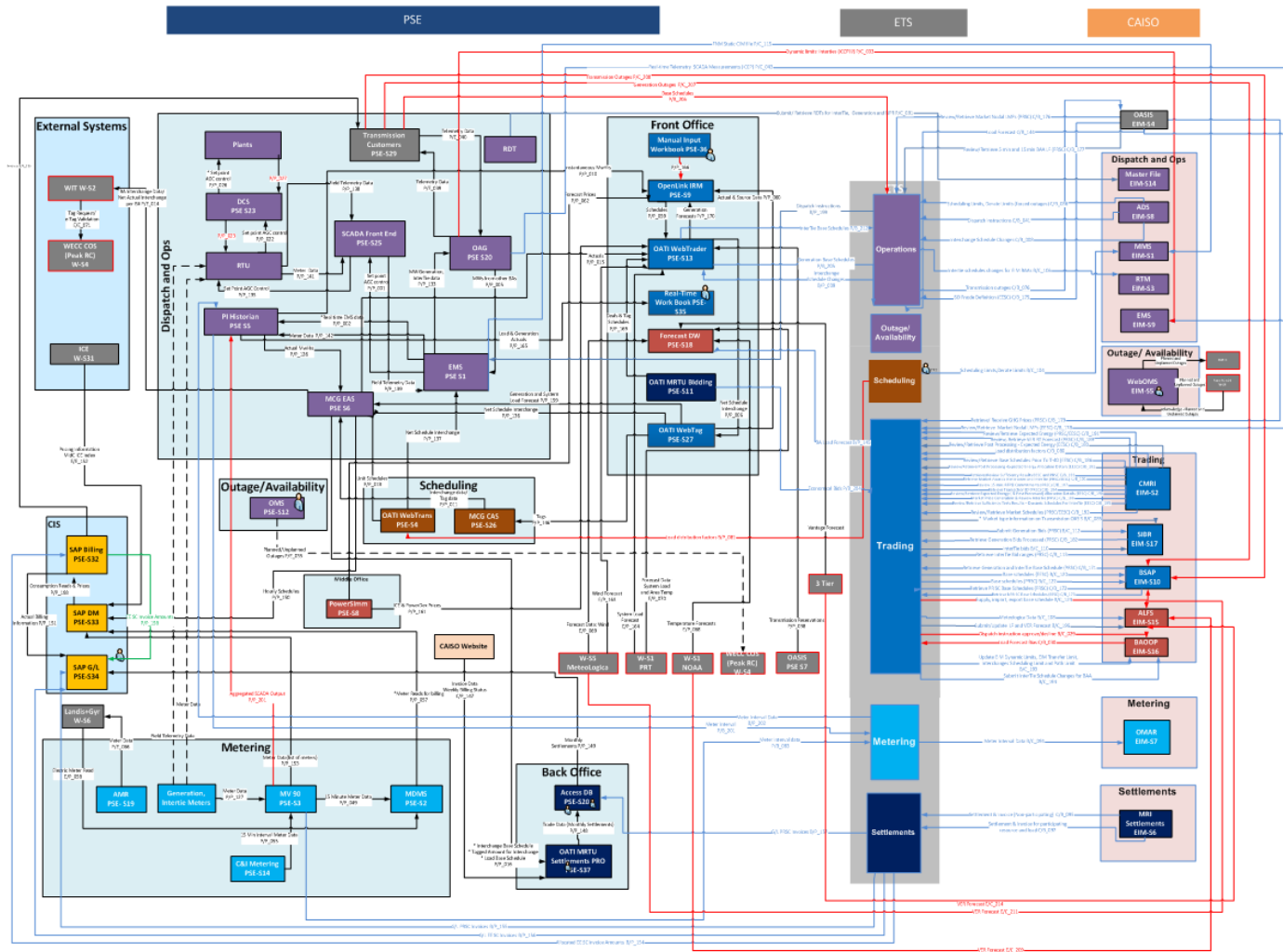


# Agenda

- System Integration
- Parallel Operations
- Market Performance
- CAISO and FERC Timelines
- Upcoming Market Design Issues

# System Integration

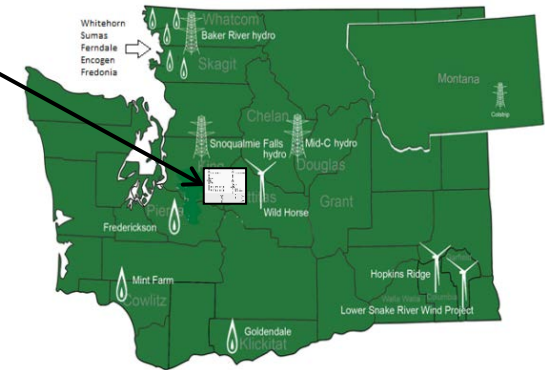
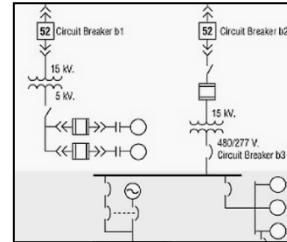
Total PSE Applications Impacted: ~28  
Total Number of Added/Changed Interfaces: ~97



# System Integration

## Full Network Model

- PSE Inputs:
  - Real Time Load, Generation, Voltage, and Transmission Flow Values
- CAISO Outputs:
  - Pricing Nodes, CAISO State Estimator



## Master File

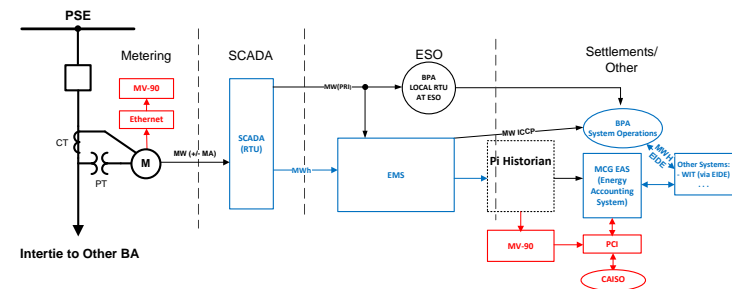
- Resource characteristics and costs (i.e., ramp time, start up, capacity)

RDT Processing Errors for file: BAD\_Intertie\_RDT\_v2.xls

Sheet Name	Resource Id	Cell Location	Error Message
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	A3	Resource Id > 32 characters
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	B3	Energy Type needs to be 'FIRM', 'NFRM', 'WHL', or 'UCTG'
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	C3	Minimum Hourly Block Limit needs to be a valid number
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	F3	Certified for A/S Non Spin RTM needs to be 'Y' or 'N'
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	G3	Spinning Reserve Cap needs to be a valid number
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	I3	Certified for RUC needs to be 'Y' or 'N'
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	N3	Wheeling Reference Number > 32 characters
Intertie Resource	TEST_MARKET01_E_F_DAO_TEST_MARKET01_E_F_DAO	B4	Energy Type needs to be 'FIRM', 'NFRM', 'WHL', or 'UCTG'
Intertie Resource	TEST_MARKET01_E_F_DAO	C4	Minimum Hourly Block Limit needs to be a valid number
Intertie Resource	TEST_MARKET01_E_F_DAO	D4	Certified for A/S Spin needs to be 'Y' or 'N'
Intertie Resource	TEST_MARKET01_E_F_DAO	F4	Certified for A/S Non Spin RTM needs to be 'Y' or 'N'
Intertie Resource	TEST_MARKET01_E_F_DAO	G4	Spinning Reserve Cap needs to be a valid number
Intertie Resource	TEST_MARKET01_E_F_DAO	H4	Non-Spinning Reserve Cap needs to be a valid number
Intertie Resource	TEST_MARKET01_E_F_DAO	I4	Certified for RUC needs to be 'Y' or 'N'

## Metering

- 5 minute (Generation Meters)
- Settlement Quality Meter Data
- ISOME or SCME



# Parallel Operations

- Dry run for PSE's 10/1 go-live cutover
- Effective training for real-time staff
- Opportunity to refine business process and improve applications performance
- Testing unit by unit to receive and operate to CAISO's Dispatch Operating Target
- Successfully Completed Readiness Criteria
  - FERC filing August 24<sup>th</sup>

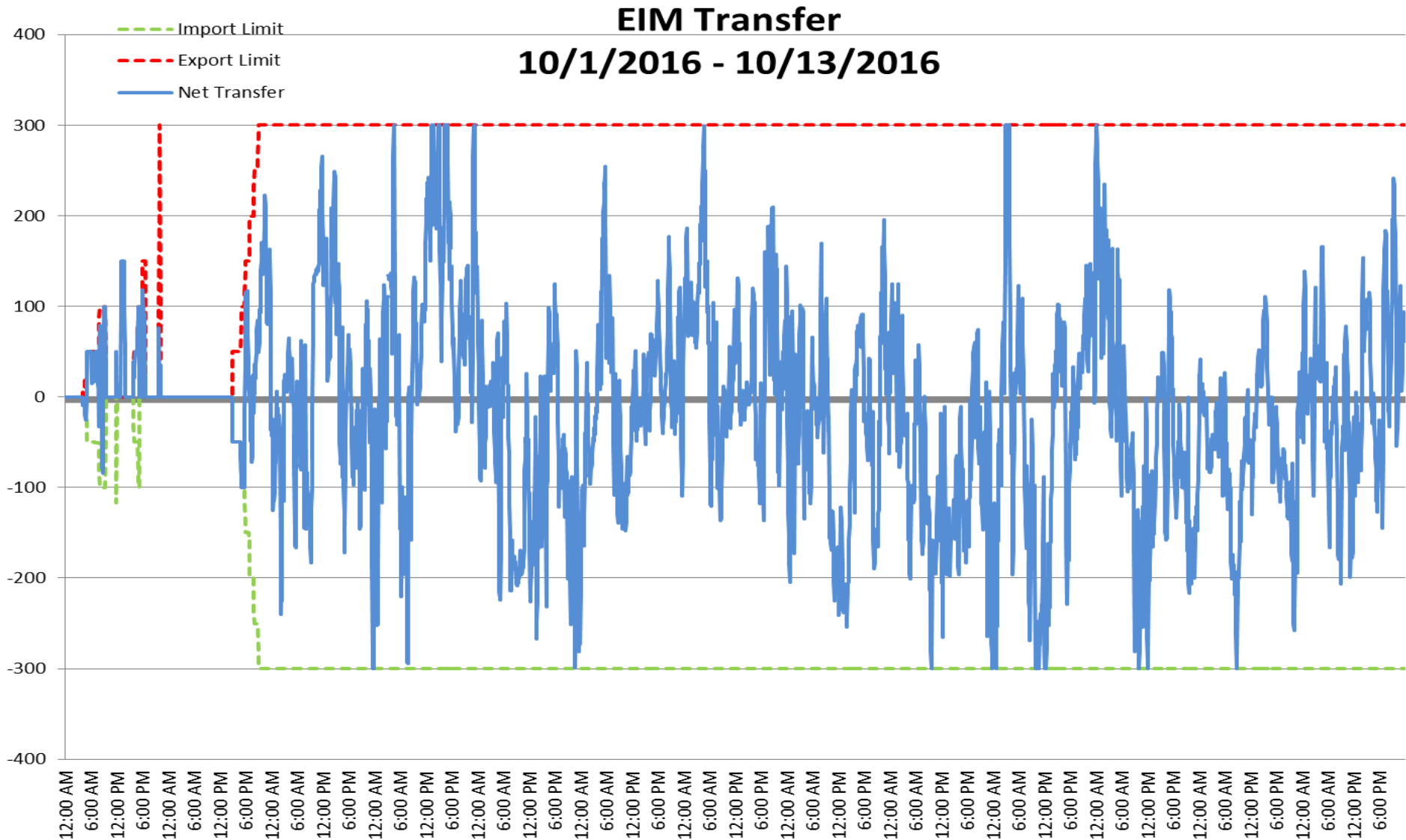


# Market Performance

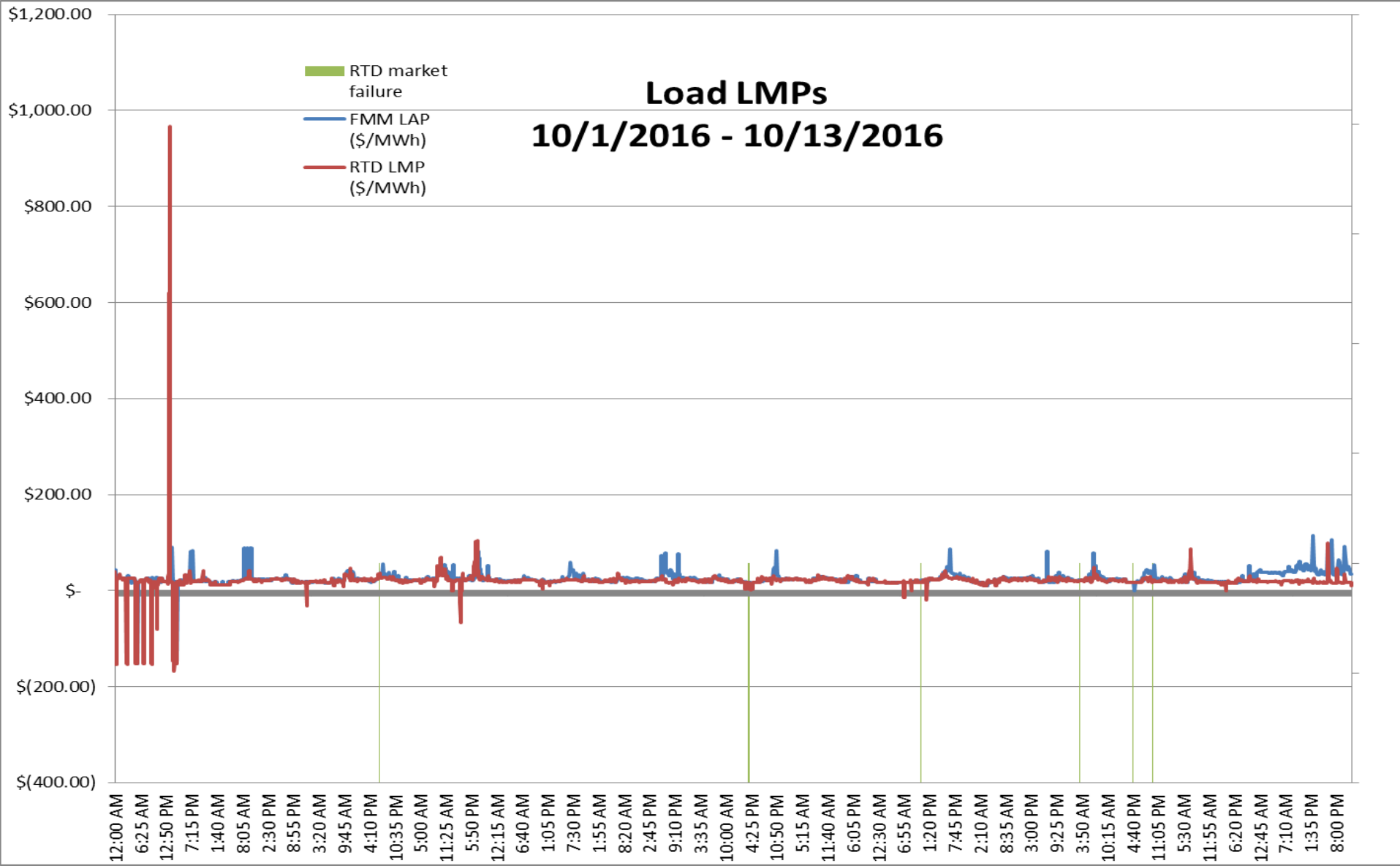
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- Limited sufficiency test failures
  - Balancing
  - Flex Ramp
  - Capacity
- Very few FMM or RTD infeasibilities
- ELAP prices are normal with a few exceptions
- PSE participating generation consistently following Dispatch Operating Targets
- Rate of Change Constraints

# Market Performance – EIM Transfers

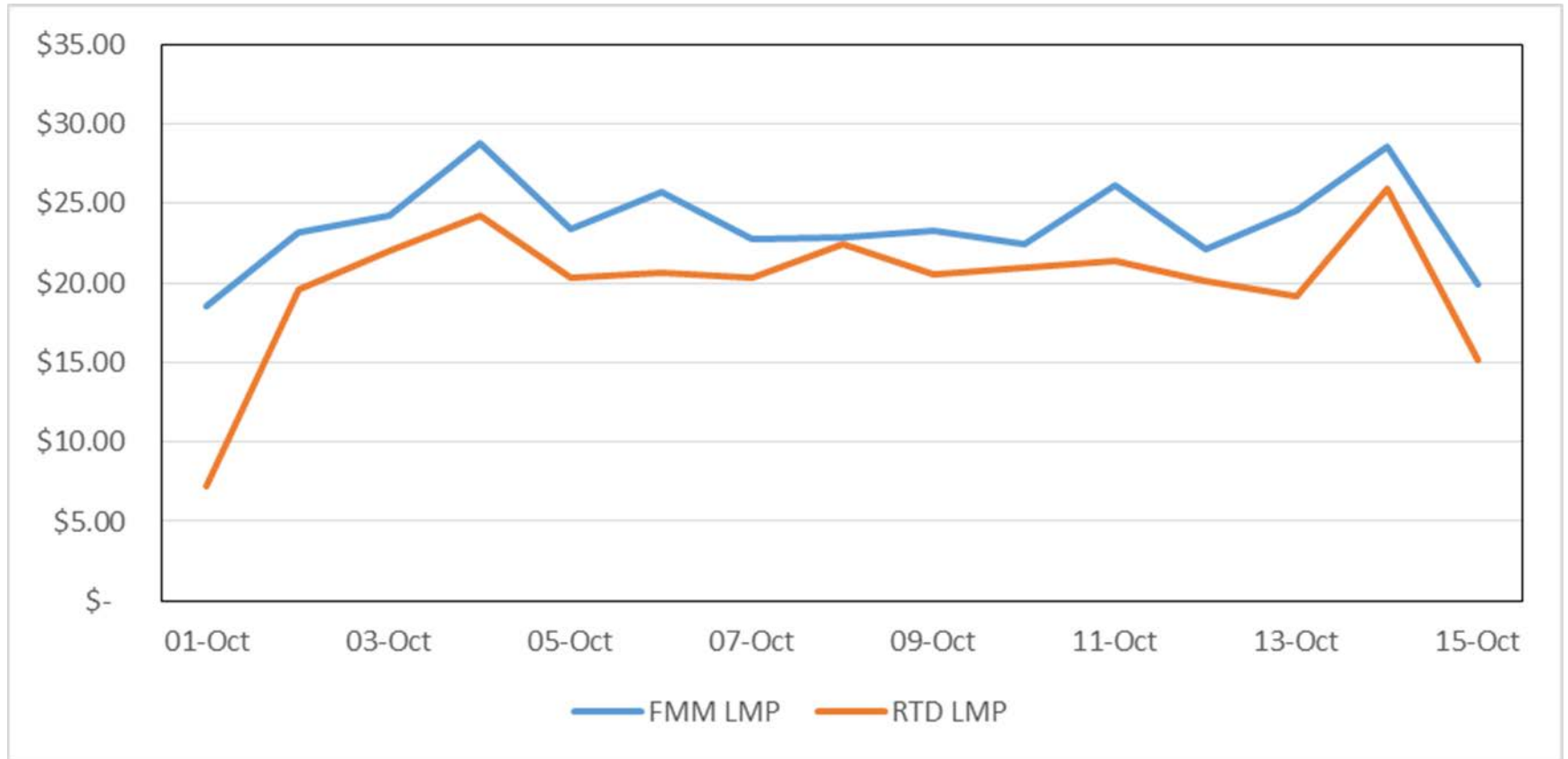


# Market Performance - Pricing





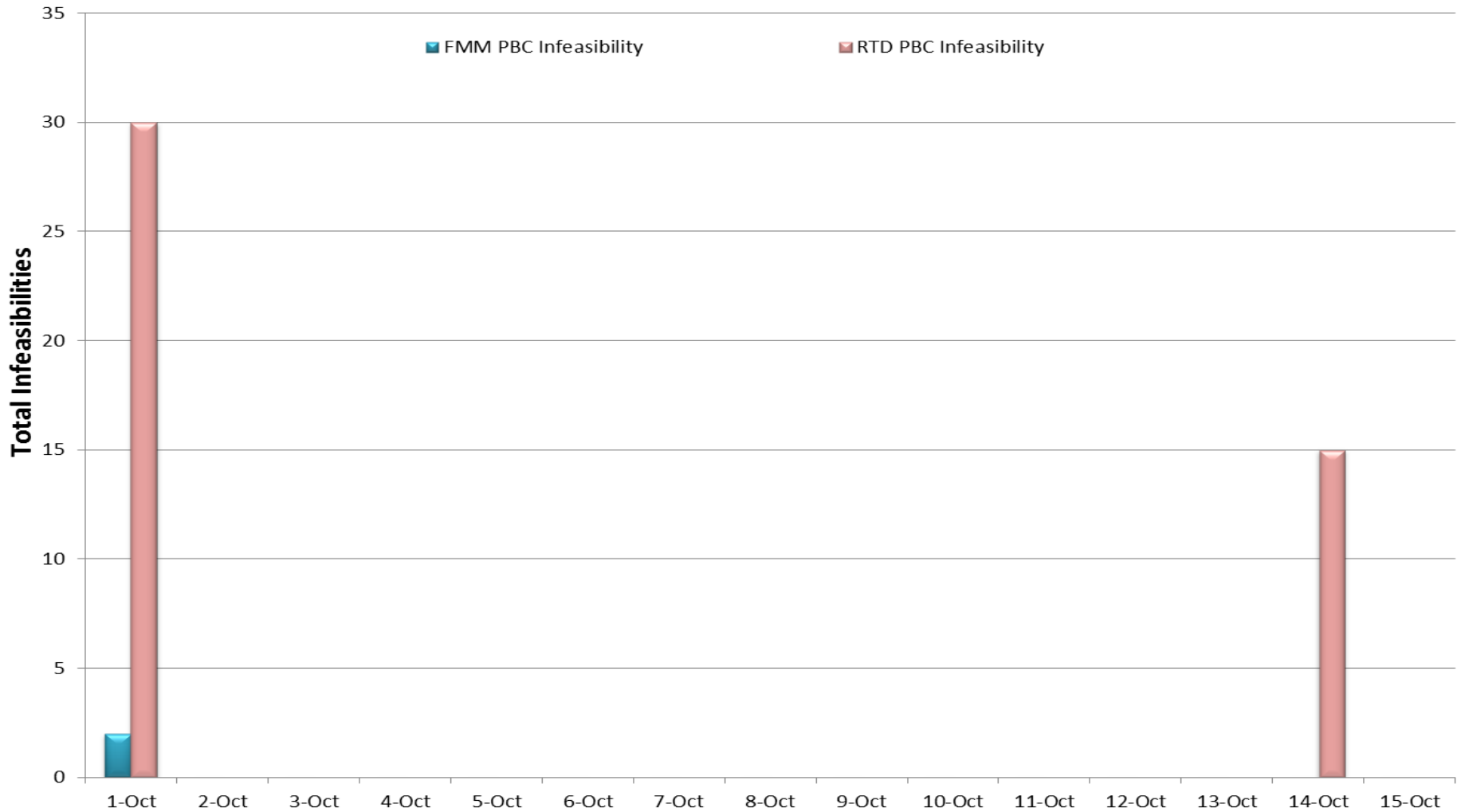
# Market Performance - Average PSE Price in FMM and RTD market



\* Prices still under price validation and subject to change

# Market Performance – Infeasibilities

## Market Power Balance Constraint Infeasibilities

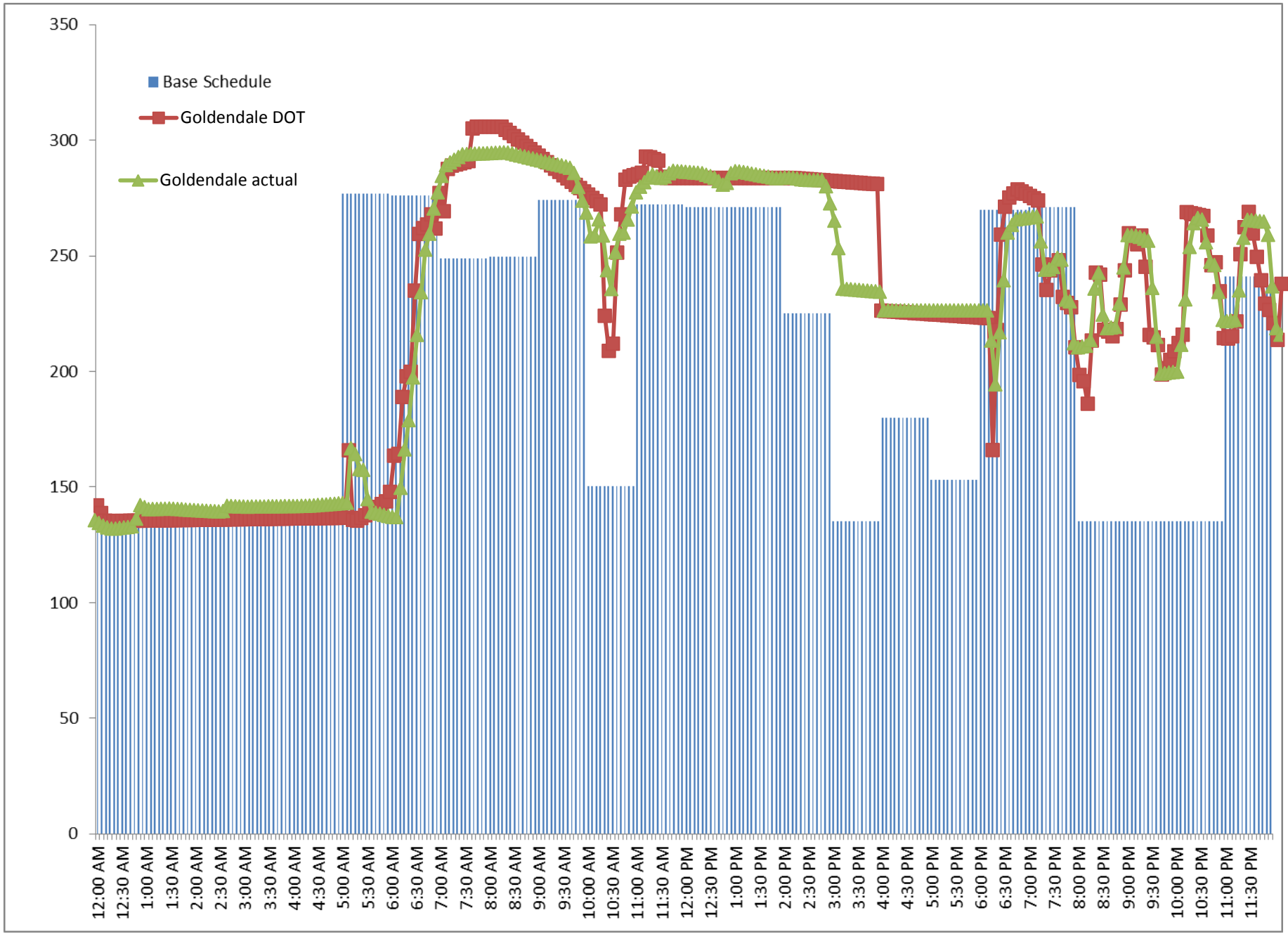


# Merchant Business Process Changes

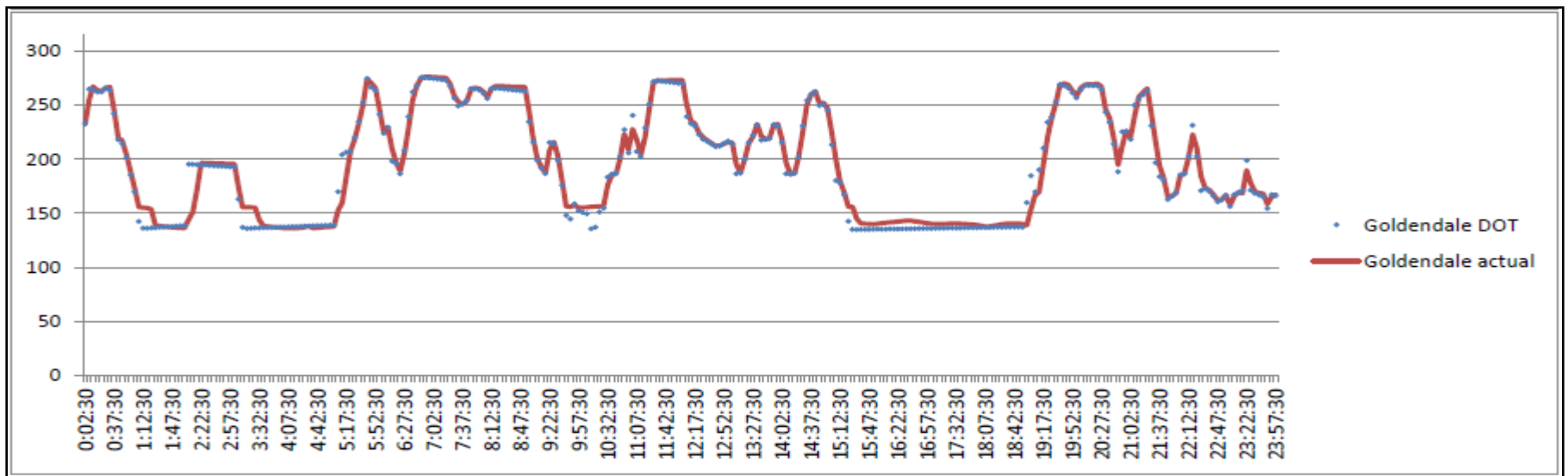
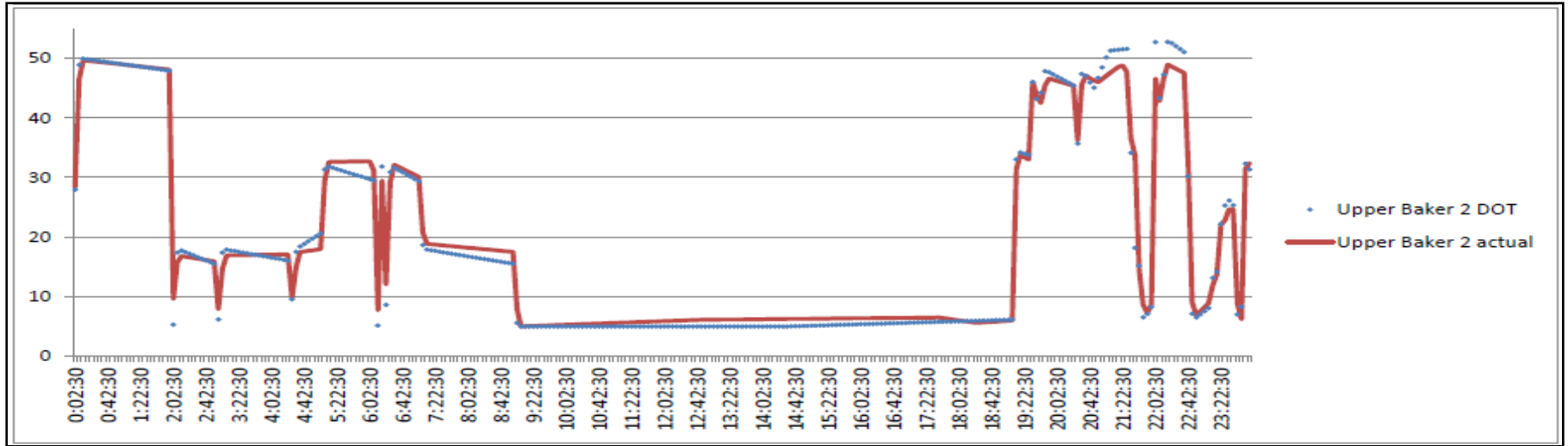
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- **PSE still actively trading in short term bilateral markets**
  - Day-Ahead
    - Economically dispatching resources to meet forecasted demand
    - Buy/sell energy to meet demand & optimize resources
    - Unit Commitment and plant coordination
  - Real-Time
    - Monitoring changes to demand and resource stack based upon day of conditions
    - Buy/sell energy to meet demand & optimize resources
- **CAISO EIM adds new requirements for Participating Resources**
  - Day-Ahead
    - 7 day forecasts provided
  - Real-Time
    - Balanced base schedule
    - Hourly bids for each generation resource participating in the market
    - EIM scheduling timelines pushing back time to execute real-time trades

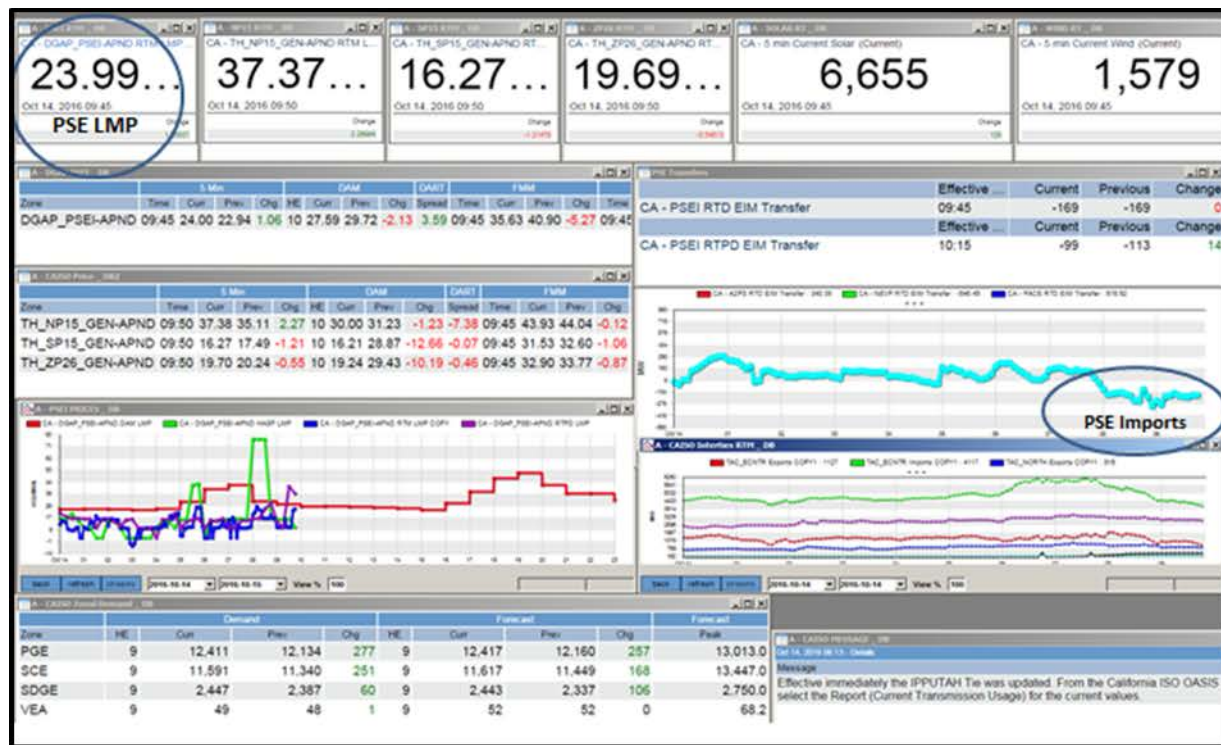
# Goldendale Example – October 10th



# Market Performance – Dispatch Operating Targets



# Example Scenario - October 14<sup>th</sup>



WIND GENERATOR	X UNIT	MW's
Hopkins Ridge	11	-3.4
	12	-13.8
	13	-13.8
	21	-19.9
	22	-25.2
Wild Horse	23	-20.1
	11	-23.1
	12	-22.9
	13	-19.5
	14	-17.5
	15	-17.6
	21	-22.4
	22	-19.1
Lower Snake River:	23	-21.2
	24	-21.2
	25	-23.1
	31	-16.8
	32	-21.6
	PHG:	-84.1
	DJN:	-27.2
	Total Wind	-415.1

- Wind dropped off from ~ 600 MW to 400 MW
- EIM transfers (imports) increased at cost lower than PSE thermals

# CAISO and FERC Timeline

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- Federal Energy Regulatory Commission
  - Market Based Rate Tariff
    - Approved September 30, 2016
  - OATT Tariff
    - Final tariff provisions became effective October 1, 2016
    - Filed notice with FERC October 3, 2016
- CAISO Market Performance
  - PSE Transitional Period – Oct. 1, 2016 for 6 Months
    - Monthly transitional period reports from CAISO and DMM (similar to NV Energy Docket ER15-2565)
    - First report from CAISO ~ November 15, 2016
  - Quarterly Benefits Report
    - Will come out Q1 2017 for Q4 2016

# EIM Market Design Issues

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## **Green House Gas**

- California Air Resources Board Amendments
  - Proposed Effective Date: January 1, 2018
  - PSE filed Comments with other EIM Entities
  - CARB Staff Currently Revising Amendments
- CAISO Stakeholder Initiative for 2017 (Comments Due 10/27/16)
  - Three Options to Address “Leakage” in EIM
    - \*Add Hurdle Rate for Transfers into CAISO
    - Change Optimization Model – Resource Specific
    - Use Balancing Account to net Exports/Imports in EIM Market

## **Intertie Bidding**

- Intertie Bidding Technical Conference at FERC, October 28, 2016



# Questions

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