



# Energy imbalance market update

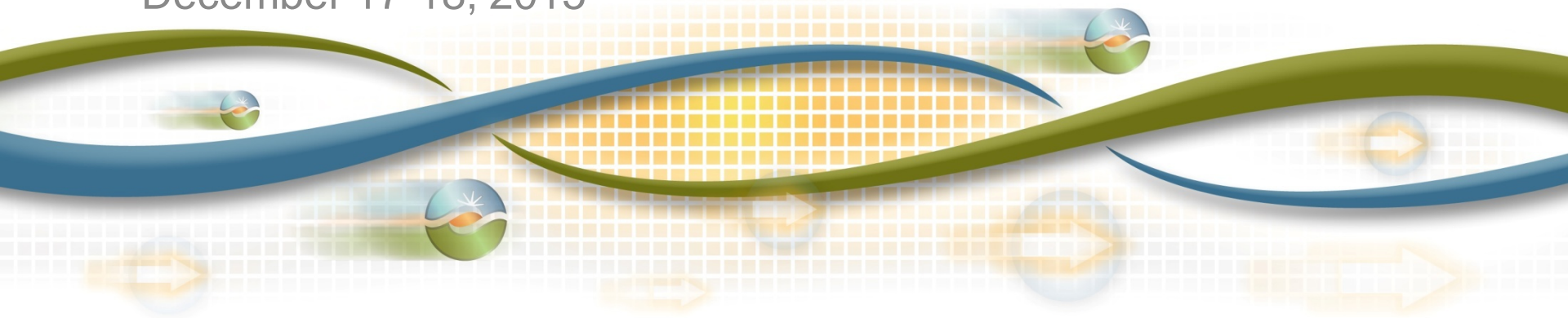
Mark Rothleder

Vice President, Market Quality and Renewable Integration

Board of Governors Meeting

General Session

December 17-18, 2015

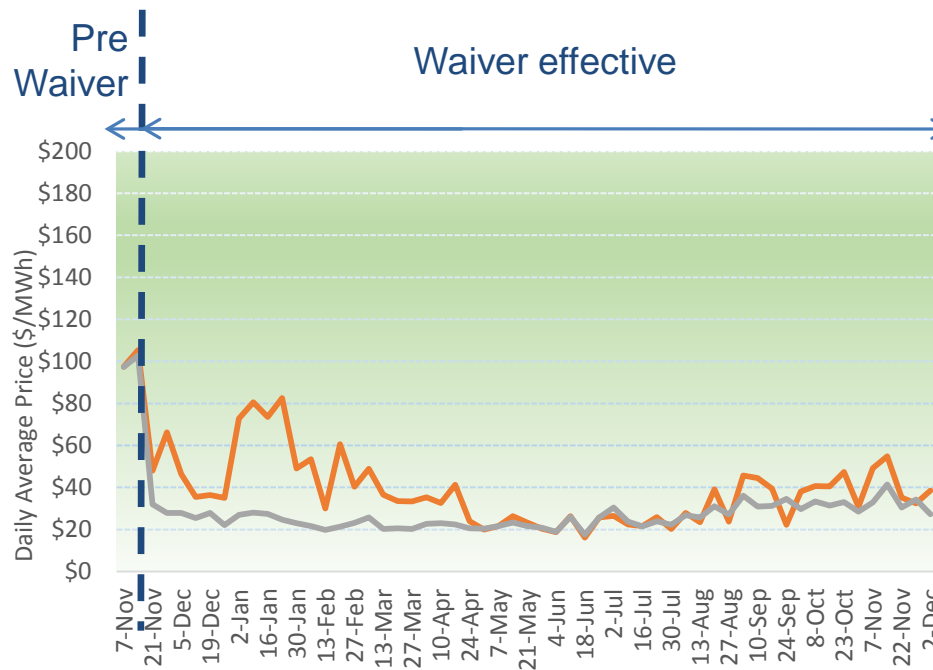


# EIM operations update

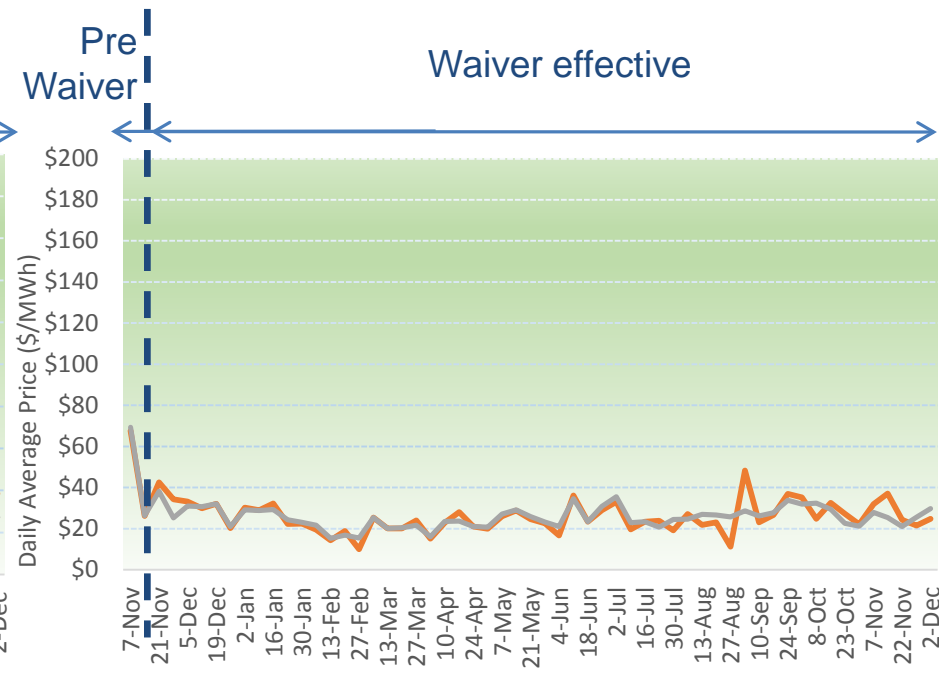
- NV Energy successfully integrated December 1.
- FERC approved ISO's tariff revision – enhancing the EIM functionality
  - Automatically recognize and account for capacity each EIM entity has available but not bid
  - Monthly informational reports on market performance for each EIM balancing authority's six-month transition period
  - Quarterly informational performance reports on Available Balancing Capacity
  - Informational reports on use of load biasing and adjustments to load forecasts
- FERC affirmed the use of ATC to support EIM transfers, including the ISO's market timelines and reciprocity

# During September thru November observed increased frequency waiver was effective in PACE

## 15-minute PACE Aggregate Price



## 15-minute PACW Aggregate Price

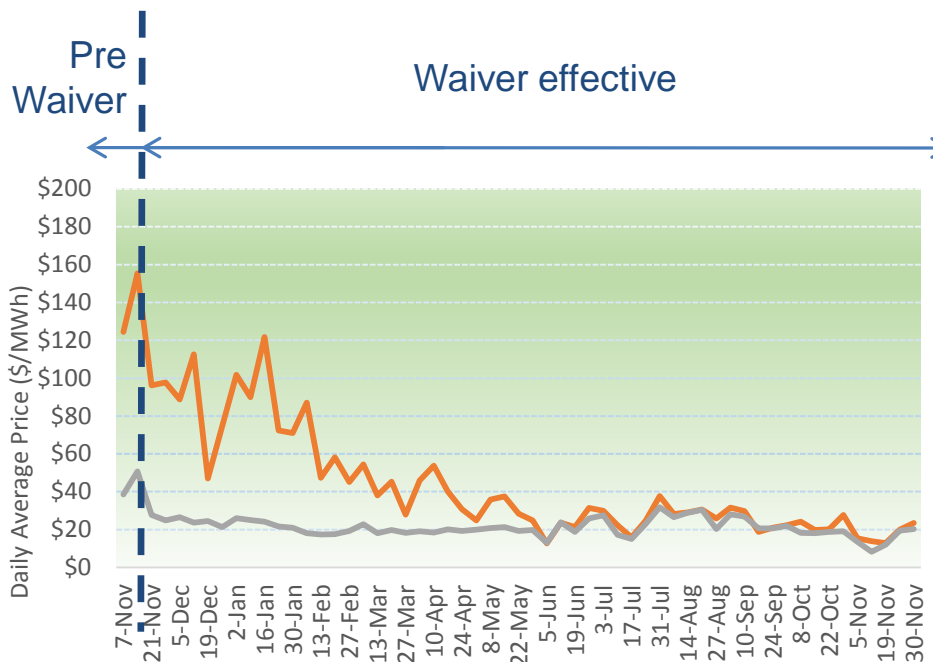


Without Waiver

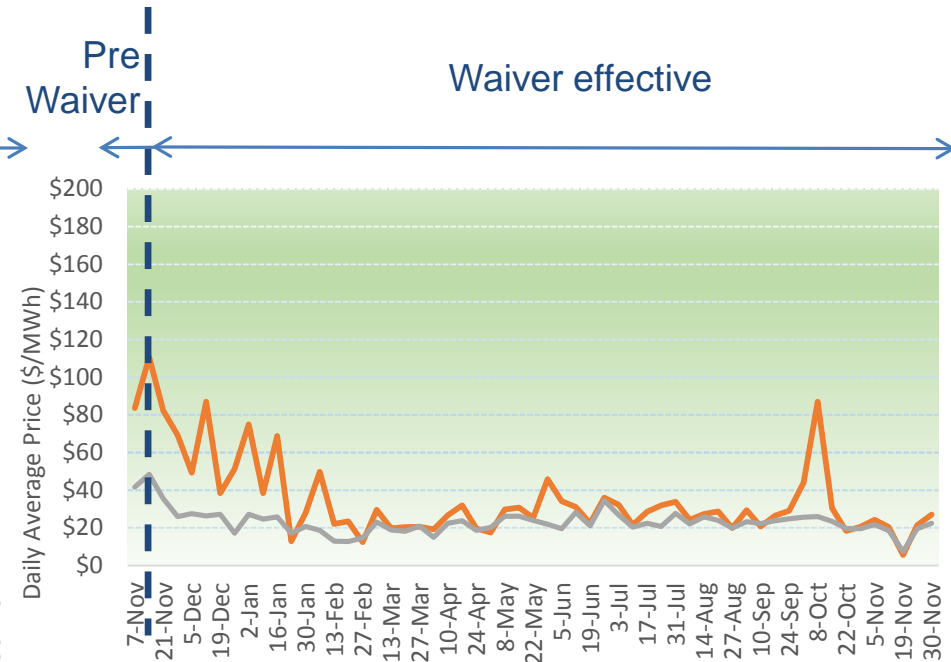
Current Prices

# 5-minute prices in PACW affected by waiver in September / October due unavailability of transfer from PACE to PACW

## 5-minute PACE Aggregate Price



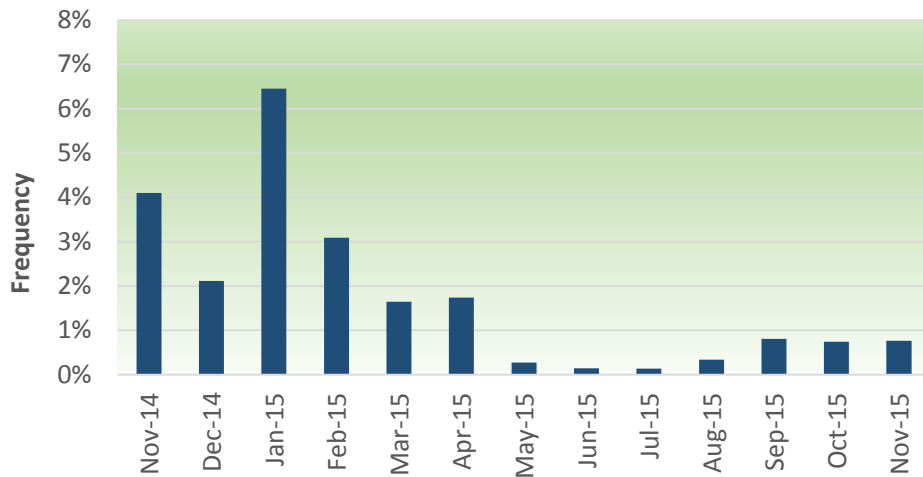
## 5-minute PACW Aggregate Price



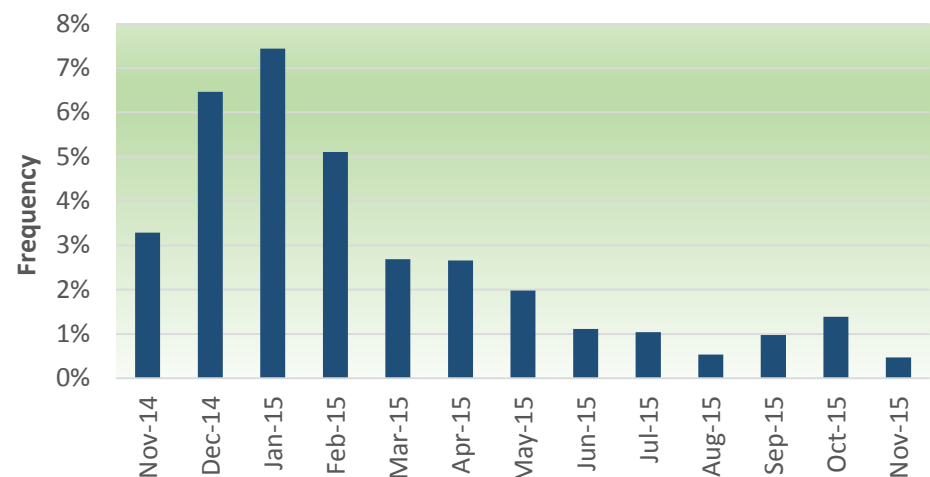
— Without Waiver — Current Prices

# Frequency of power balance constraint infeasibilities in PacifiCorp areas

## 15-Minute Market

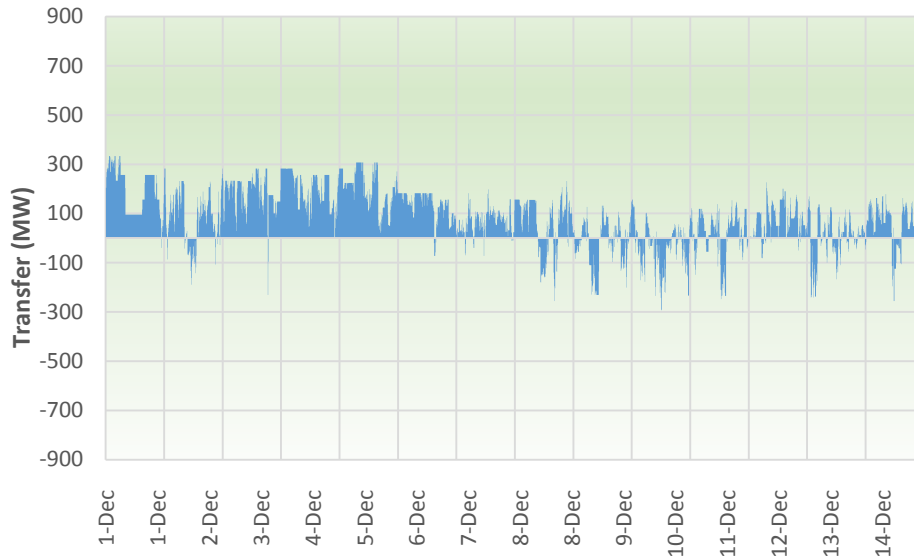


## 5-Minute Market

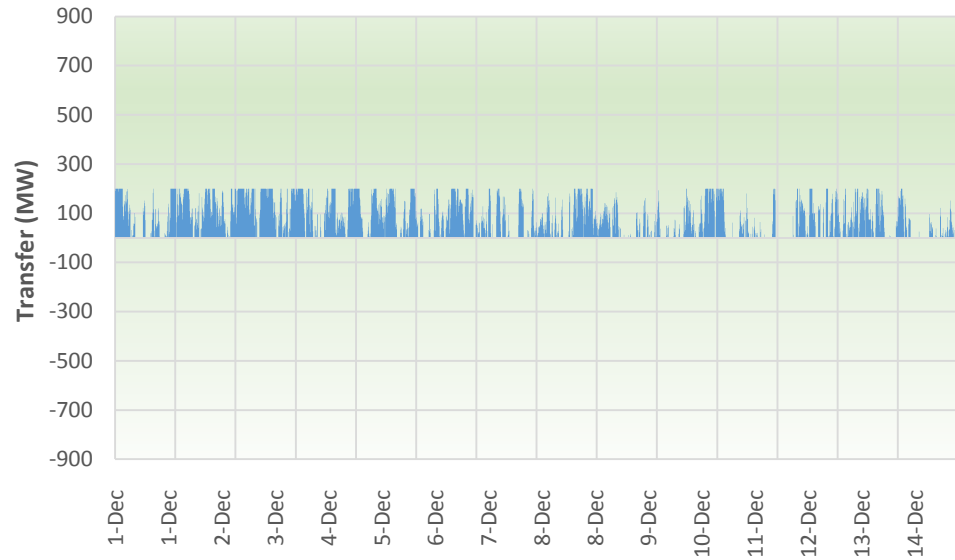


# Transfers from PACW to ISO and PACE to PACW

## Transfers from PAC West to CAISO



## Transfers from PAC East to PAC West

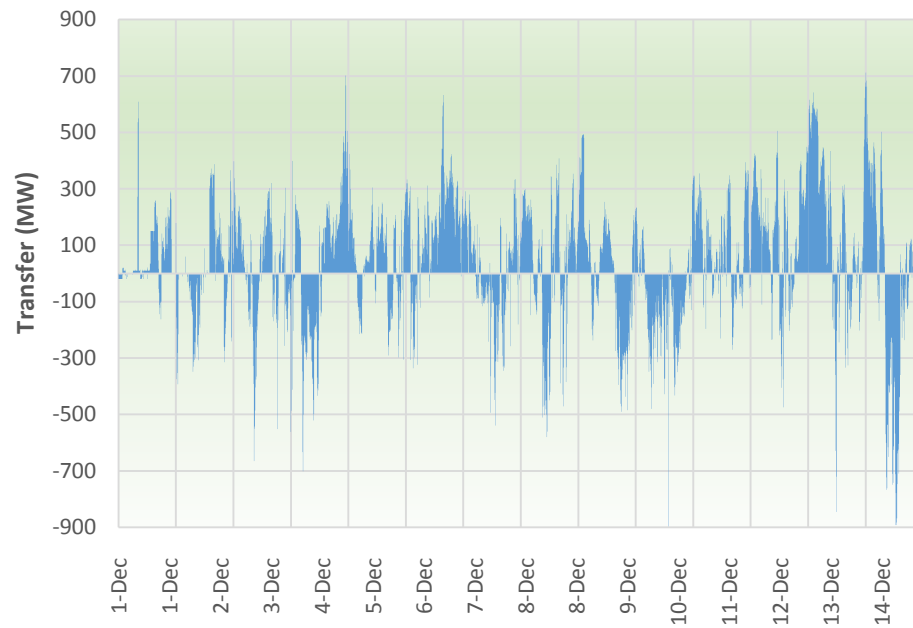


# NV Energy update

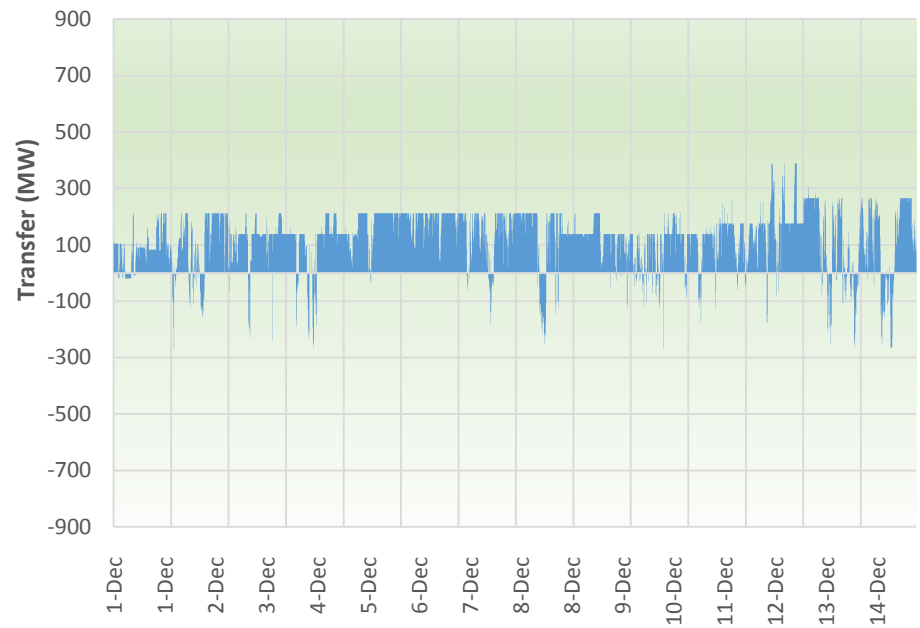
- NV Energy EIM became effective on December 1, 2015
- During the first 14 days of operation NV Energy has
  - passed 92.5% of the balancing test, with 4.1% failures for undersupply and 3.2% for over-supply
  - passed 99.4% of the flex ramp sufficiency test
  - 100% of fifteen- and 99.9% of five-minute intervals with no power balance constraint infeasibilities

# NV Energy Transfers

## NV Energy to ISO



## PACE to NV Energy

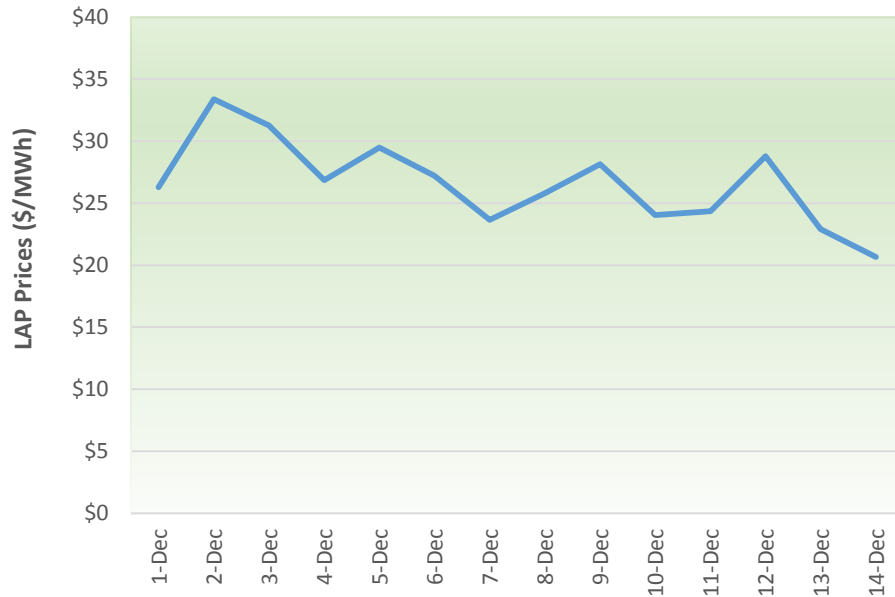




# EIM prices after activation of NV Energy area

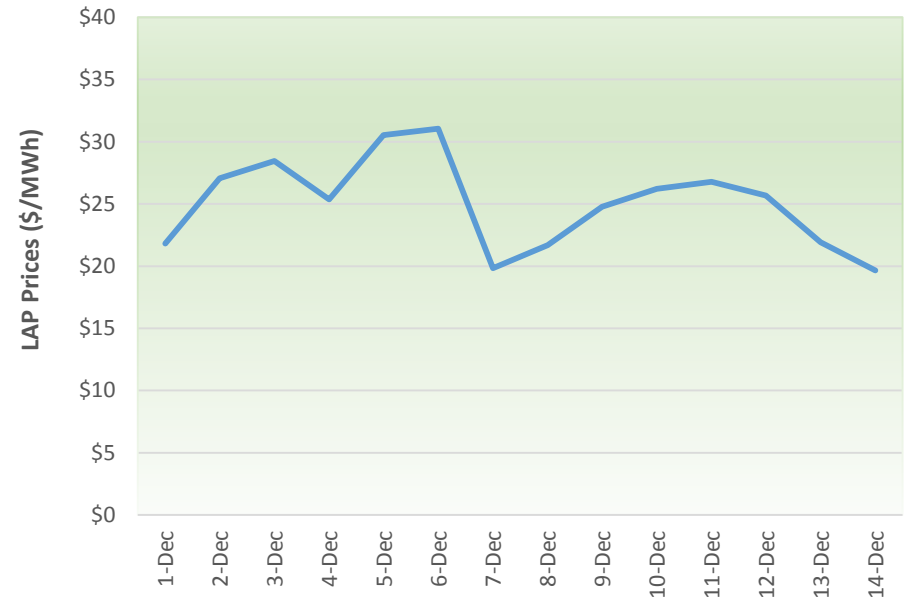
## 15-Minute Market

NEVP Aggregate Price



## 5-Minute Market

NEVP Aggregate Price



# Transfer into ISO by supporting resource type

Month	Coal (%)	Gas (%)	Non-Emitting (%)	Total
15-Jan	0.06%	6.04%	93.90%	100%
15-Feb	0.32%	88.89%	10.79%	100%
15-Mar	0.46%	99.54%	0.00%	100%
15-Apr	0.13%	65.48%	34.39%	100%
15-May	0.00%	84.37%	15.63%	100%
15-Jun	0.00%	72.95%	27.05%	100%
15-Jul	0.00%	65.16%	34.84%	100%
15-Aug	0.02%	86.48%	13.50%	100%
15-Sep	0.00%	92.27%	7.73%	100%
15-Oct	0.10%	99.90%	0.00%	100%

# The ISO and future EIM Entities continue coordination on implementation activities

- Puget Sound Energy and Arizona Public Service on track for October 1, 2016 implementations.
- Portland General Electric filed its implementation agreement with FERC and its intent to join the EIM in October 2017.
- Idaho Power continues to explore participation in the EIM.