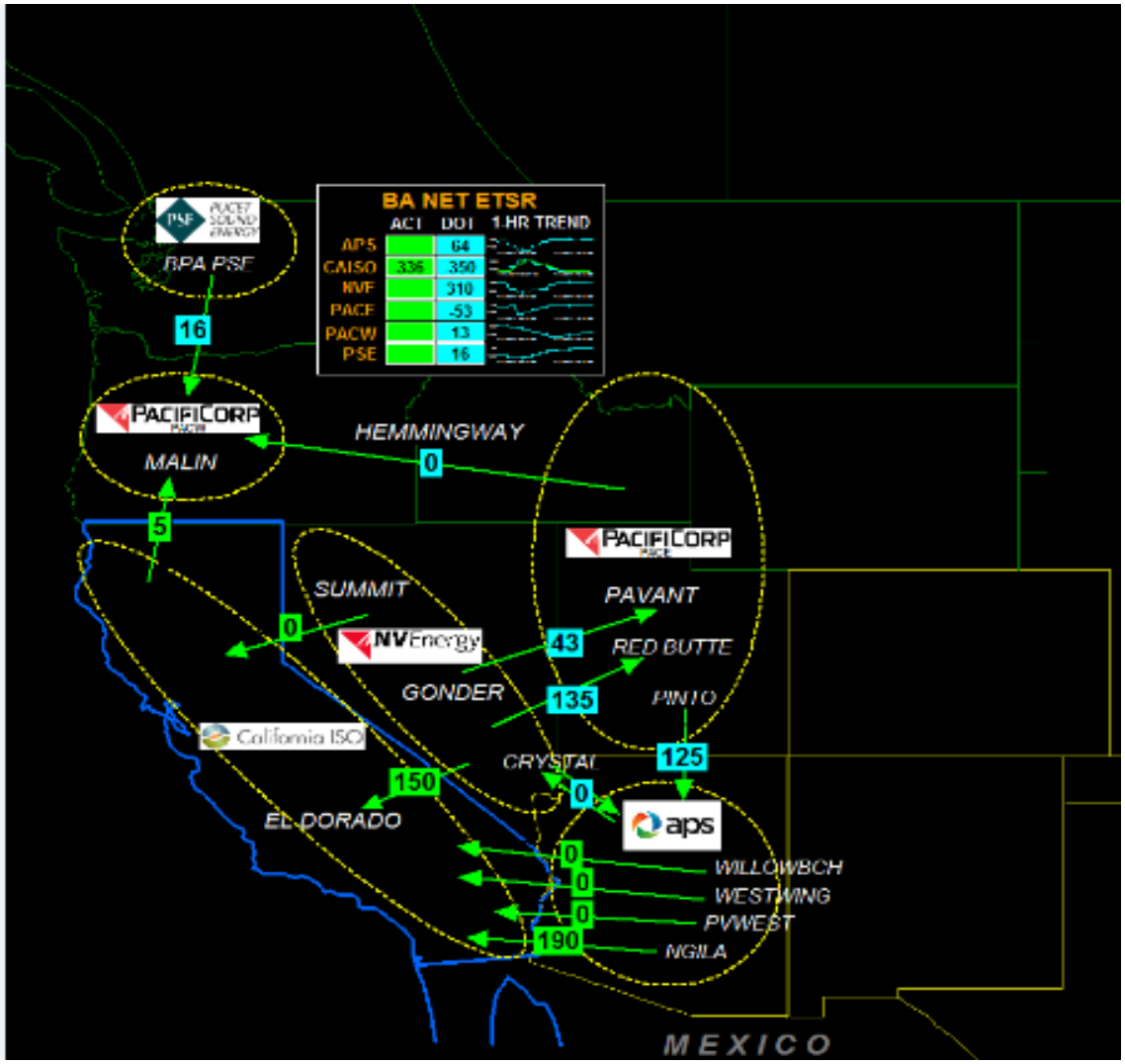
Briefing on Western Energy Imbalance Market

Casey Cadle – Real Time Operations, Shift Manager
John Phipps – Director, Real Time Operations

EIM Governing Body Meeting
General Session
February 1, 2017

Energy imbalance market energy transfers on established transmission paths and EIM Entities



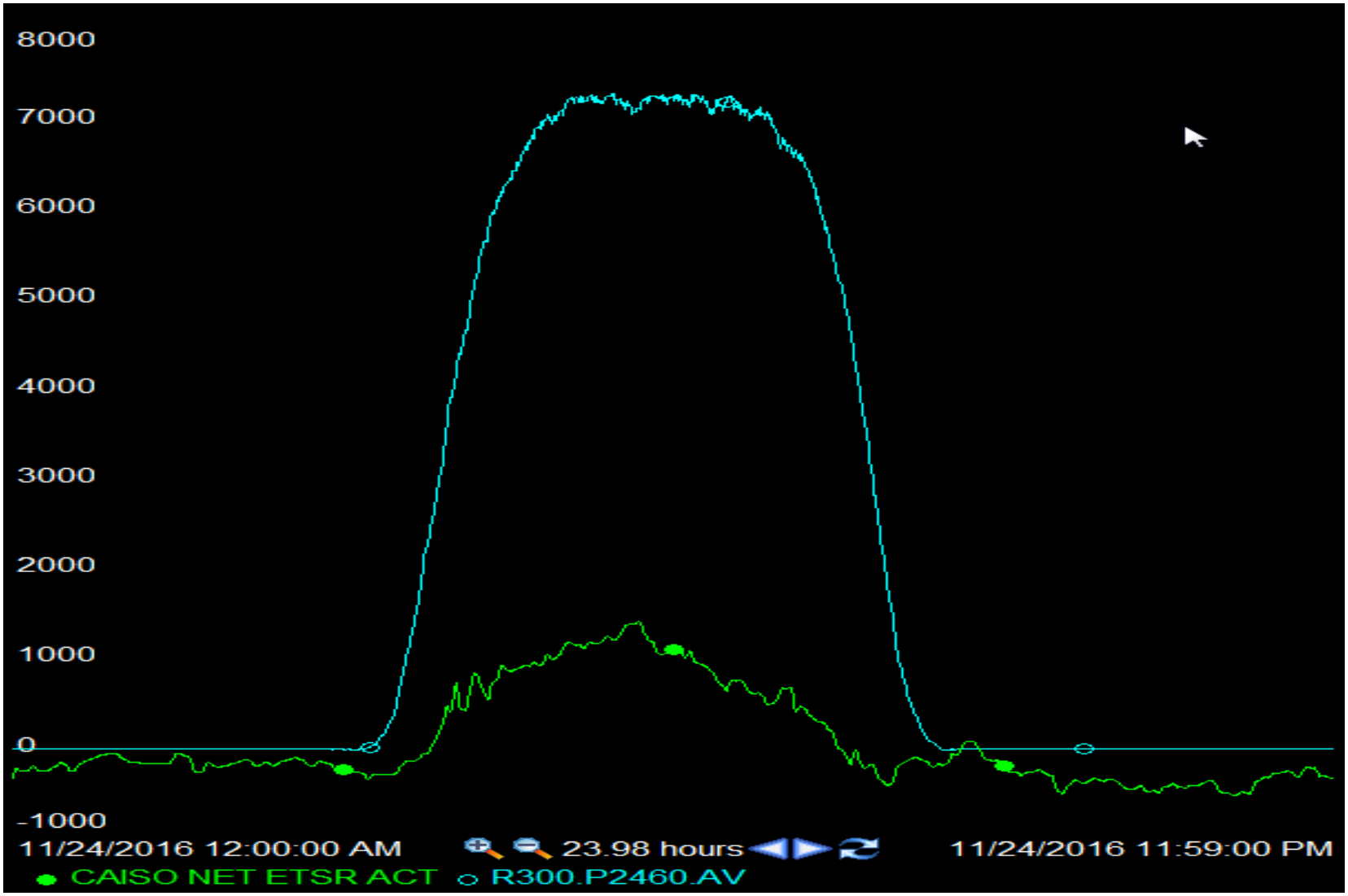
The energy imbalance market has enhanced the management of system reliability

- Key areas where EIM transfers supported system reliability
  - Energy over supply
  - Renewable resource volatility

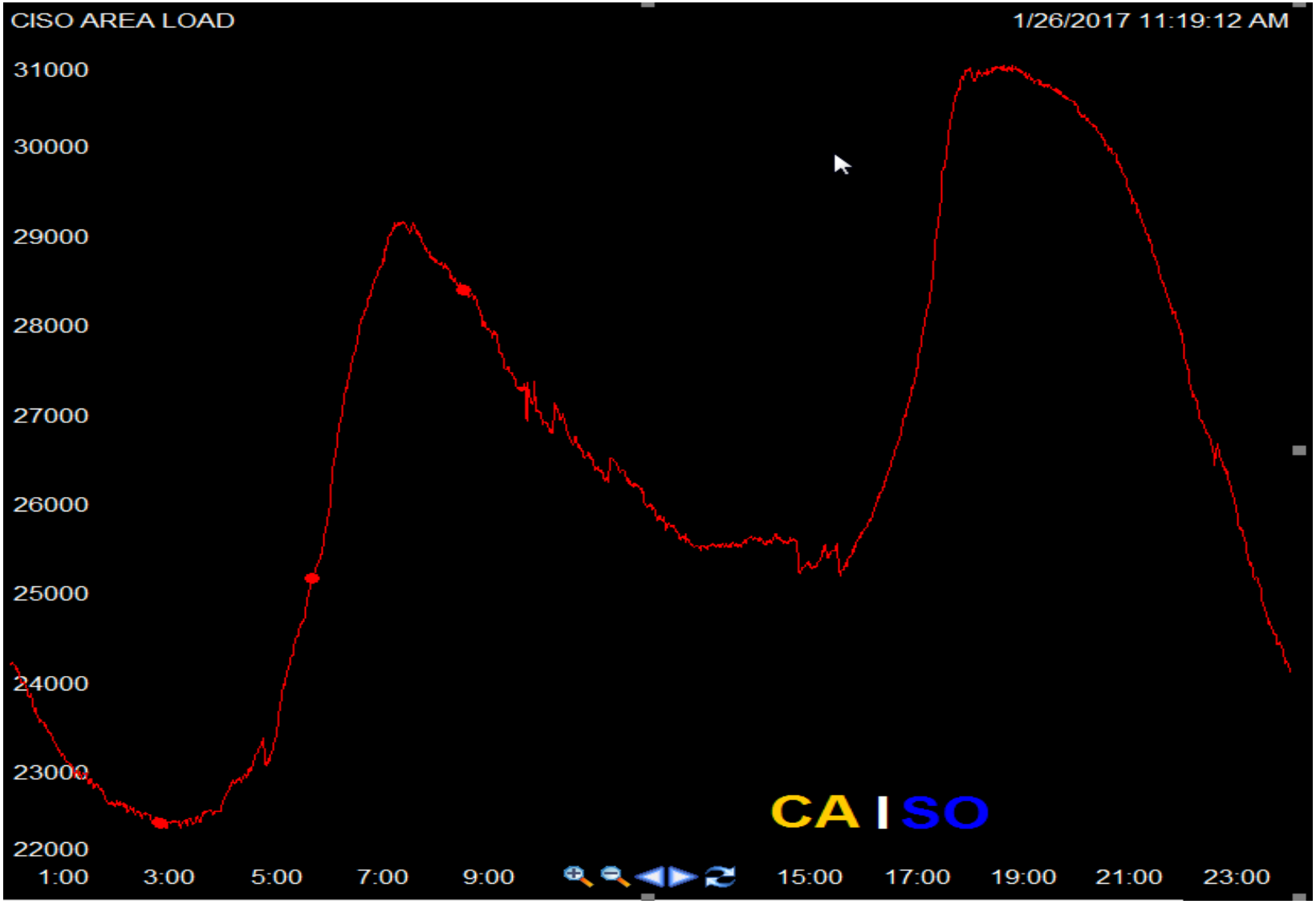
EIM regional transfers allow the ISO and EIM Entities to transfer low cost energy during periods of oversupply

- Main oversupply examples include:
  - Morning ramp up of solar resources
  - Low mid-day system loads
  - Springtime conditions of high hydro and solar output combined with low system load

ISO solar ramp with net energy transfers



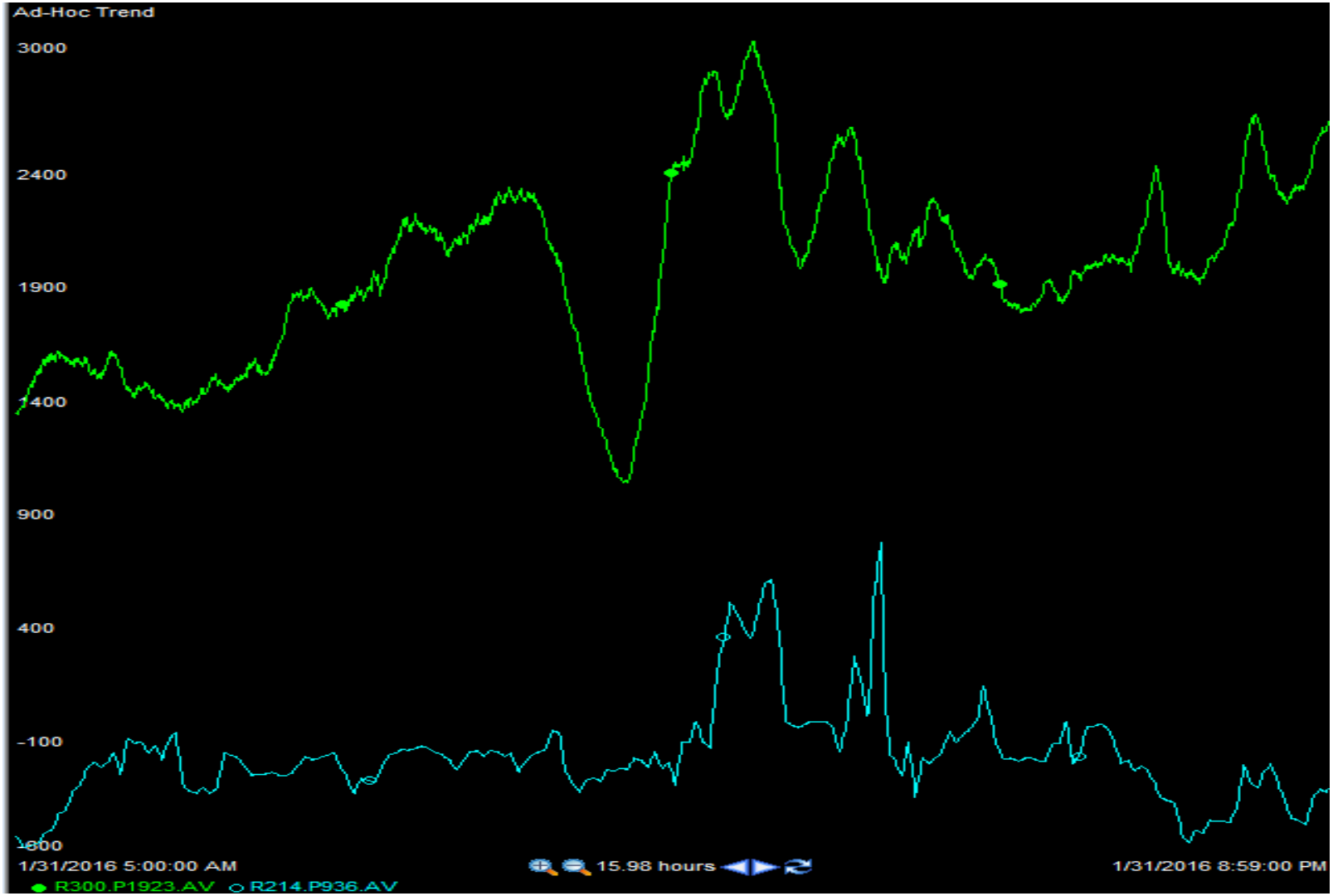
ISO winter and spring load curve



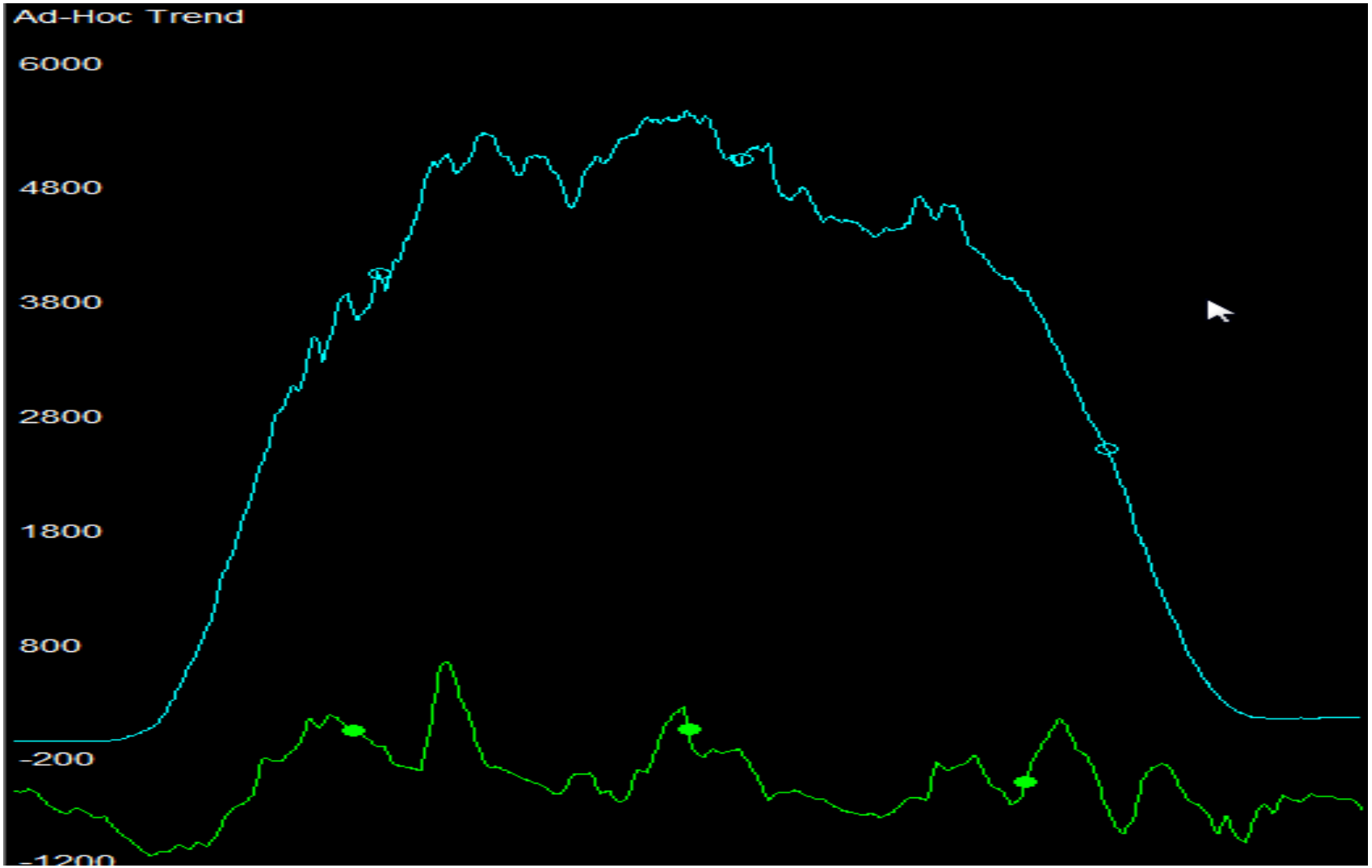
Management of renewable resource volatility is enhanced by energy imbalance market transfers

- EIM transfers provide EIM entities additional resources to manage swings in renewable output
- Common causes of volatility are:
  - Large variations in weather such as wind storms or cloud cover

High wind volatility with EIM transfer response



Solar volatility with EIM transfer response



Questions?