Welcome to the California Independent System Operator

August 7, 2015
The California ISO is one of nine independent/regional transmission operators (ISOs/RTOs) in North America.

Two-thirds of the United States is served by these independent grid operators.
California ISO

- **Nonprofit** public benefit corporation
- **Part of Western Electricity Coordinating Council**: 14 states, British Columbia, Alberta and parts of Mexico
- **66,000** MW of power plant capacity
- **50,270** MW record peak demand (July 24, 2006)
- **26,014** circuit-miles of transmission lines
- ISO is governed by the Federal Energy Regulatory Commission, which has jurisdiction over transmission lines that cross state borders.
- Delivers 235,000 megawatt-hours of power in 2014, via 27,600 market transactions per day to over 30 million consumers.
What does the ISO do?

• Uses advanced technology to efficiently and effectively operate the grid in day-ahead and in real-time.

• Deployment of advanced technologies enable the ISO to provide real-time 5 minute resource optimization to CA and five additional states in the West.

• Plans for transmission, generation interconnection and operates the grid in compliance with Federal reliability requirements for 80% of CA and part of Nevada.
Who oversees us?

- We are governed by a governor appointed/Senate confirmed **Five Member Board**
- We are regulated by **FERC** Federal Energy Regulatory Commission
- We are compliant with **NERC** North American Electric Reliability Corporation
- We are part of **WECC** Western Electricity Coordinating Council
Benefits of the ISO

- Centralized economic dispatch optimizes use of all resources – reduces cost of serving demand
- Resolve transmission constraints economically
- Transparency on constraints and costs
- System is re-dispatched every five minutes to meet current system conditions - greatly helps with renewable integration
- Market benefits from operating a larger control area
  - reduces reserve requirements
  - geographical diversity improves market for renewables and reduces integration costs
  - capacity savings from diversity in timing of daily and annual peak loads
California energy and environmental policies drive renewable integration and transmission needs

- Greenhouse gas reductions to 1990 levels by 2020
- 33% of load served by renewable generation by 2020
- 12,000 MW of distributed generation by 2020
- Ban on use of once-through cooling in coastal power plants
- Governor Brown’s 2030 goals
  - 50% renewables
  - 50% reduction petroleum use – cars & trucks
  - double energy efficiency of existing buildings
  - make heating fuels cleaner
Solar generation doubles between now and 2020

(Existing generation)

*All online resources are included in the 2014 YTD amounts, including those yet to achieve full commercial operation.

(IOU data through 2017 and RPS Calculator data 2018 – 2020)
Non-Flexible resources create oversupply conditions and potential for RPS curtailment

- ISO has already seen the need to curtail generation in 2014
- Oversupply may lead to curtailment because of dispatch limitations on some resources, such as
  - geothermal
  - nuclear
  - small hydro
  - combined heat and power
- Operational requirements include
  - minimum gas necessary to provide ramping
  - necessary ancillary services
  - load following
Renewable curtailment in 2024 at 40% RPS is significant

Solutions

- Target energy efficiency
- Increase storage and demand response
- Enable economic dispatch of renewables
- Decarbonize transportation fuels
- Retrofit existing power plants
- Align time-of-use rates with system conditions
- Diversify resource portfolio
- Deepen regional coordination
Benefits of an Energy Imbalance Market (EIM)

Without an EIM:
Each BA must balance loads and resources w/in its borders.

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

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

- Diversity of balancing resources
- Increased flexibility
- Decreased levels of reserves
- More economically efficient
- Decreased integration costs
Energy Imbalance Market

• Supports integration of renewables by sharing diverse resources across a larger geographical area

• Leverages existing ISO real-time market

• Enhances reliability through improved situational awareness in ISO and EIM footprint

• Brings down costs by allowing access to a wider array of resources

* interested in joining the ISO as a full participant
Looking Forward Opportunities

- Integrating 50% renewables
- Mitigating over-generation issues
- Enhancing regional coordination
- Enabling distributed energy resources
- Ensuring grid reliability for LA Basin/San Diego
Get a real time view of supply and demand, renewable energy production, emergency notifications and requests for energy conservation. [http://www.caiso.com/Pages/TodaysOutlook.aspx](http://www.caiso.com/Pages/TodaysOutlook.aspx)

This information is also available on our free smart phone app, *ISO Today*. [http://www.caiso.com/Pages/ISOToday.aspx](http://www.caiso.com/Pages/ISOToday.aspx)