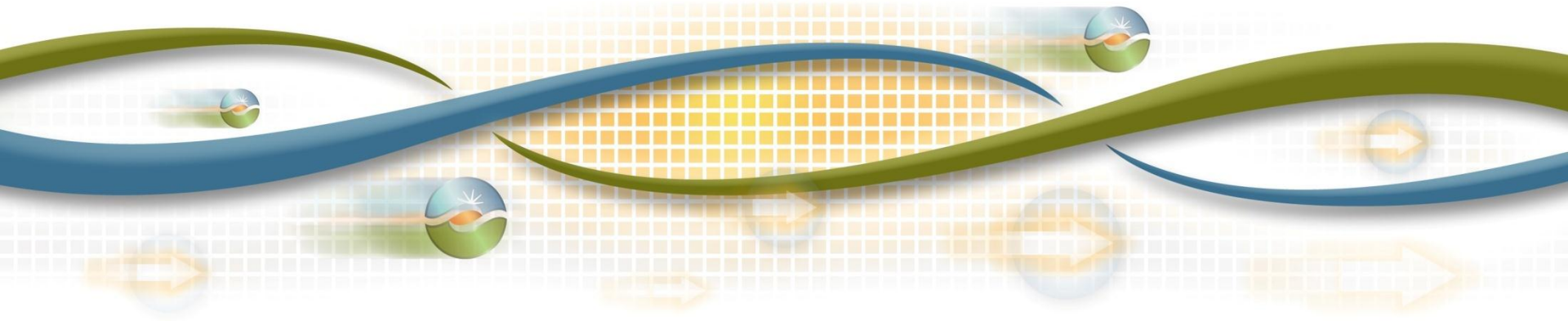


# Reactive Power Requirements and Financial Compensation

## Draft Final Proposal Stakeholder Call

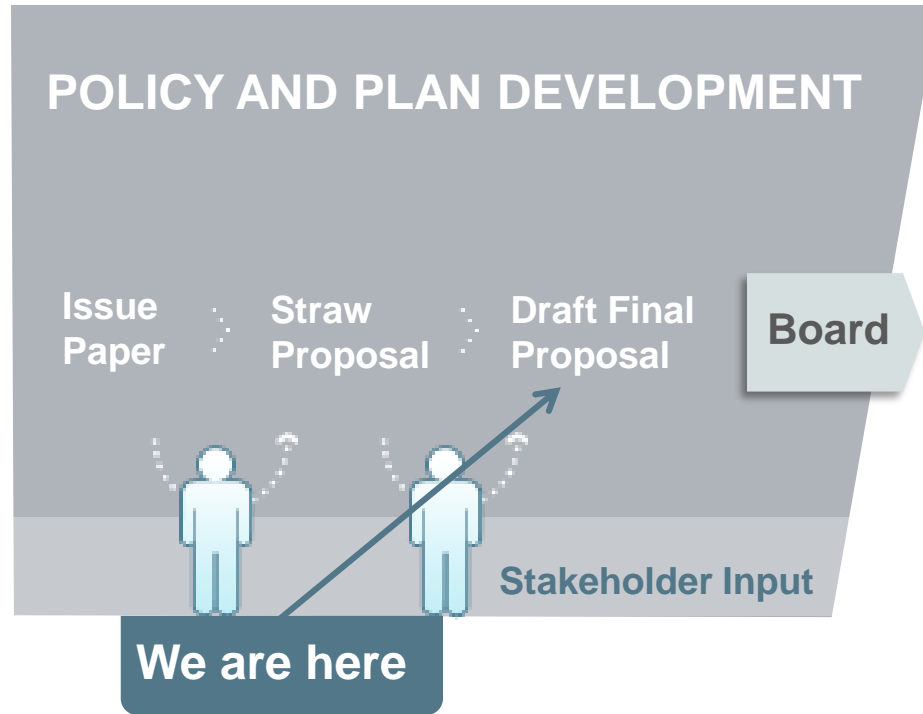
November 19, 2015



# November 19, 2015 stakeholder meeting agenda

Time	Topic	Presenter
9:00-9:05	Introduction	Kim Perez
9:05-10:30	Technical requirements	Chris Devon
10:30-12:00	Financial compensation	Chris Devon

# ISO policy initiative stakeholder process



# Stakeholder process schedule

Milestone	Date
Draft Final Proposal posted	Nov 12, 2015
Stakeholder call on Draft Final Proposal	Nov 19, 2015
Draft Final Proposal comments due	Dec 3, 2015
Board of Governors meeting	Feb 3-4, 2016

# SH comments: October 8 revised straw proposal

- Stakeholder responses included comments on technical requirements and financial compensation
- Requested clarification on some technical requirements
  - Point of control requirements (POI vs inverter terminal)
  - Electrical compensation to the POI
  - Studying collective solutions and alternative solutions beyond the POI
  - Dynamic reactive power requirements
  - Additional reactive power needs studies
  - Potential new Exceptional Dispatch category

# SH comments: October 8 revised straw proposal

- Range of responses on financial compensation issues
  - Capability payments
  - Provision payments
  - Potential new Exceptional Dispatch category
    - Compensation for clutches and other special cases
  - Incorporating lost PPA and PTC revenues into provision payments
  - Addition of voltage support and reactive power ancillary services
  - Cost allocation

# TECHNICAL REQUIREMENTS

Chris Devon

# Proposed requirements for asynchronous generators

- a) An Asynchronous Generating Facility shall have an over-excited (lagging) reactive power producing capability to achieve a real time net power factor from 0.95 lagging up to unity power factor at the POI, up to the Generating Facility's maximum real power capability.
- b) An Asynchronous Generating Facility shall have an under-excited (leading) reactive power absorbing capability to achieve a real time net power factor from 0.95 leading up to unity power factor at the POI, up to the Generating Facility's maximum real power capability.
- c) Asynchronous Generating Facilities shall provide dynamic voltage response between 0.985 leading to .985 lagging at maximum real power capability at the POI, up to the Generating Facility's maximum real power capability, as specified in Figure 3.

(continued on next slide)



## Proposed requirements for asynchronous generators (cont.)

- d) Asynchronous Generating Facilities may meet the power factor range requirement at the POI by using controllable external dynamic and static reactive support equipment.
- e) Within the dynamic reactive capability range, Asynchronous Generating Facilities shall vary the reactive power output between the full sourcing and full absorption capabilities in a continuous manner.
- f) Outside the dynamic range of .985 leading to .985 lagging, and within the overall reactive capability range of .95 leading and .95 lagging, the reactive power capability could be met at maximum real power capability with controllable external static or dynamic reactive support equipment.

# Point of control and measurement flexibility

- Proposal allows resources to choose point of control
- Must electrically compensate to meet requirements at the POI (0.95 Leading/Lagging)
- “Electrically compensated to POI” means resources may choose point(s) on system to install equipment to control voltages but must install equipment to allow resources to provide required reactive power at POI

# Point of Interconnection requirement

- FERC LGIA Order (2003) for synchronous resources specified .95 lead/lag reactive support required at POI
- ISO tariff requires synch resources provide .90 lag/ .95 lead reactive power support at generator terminals
  - Equivalent to .95 lead/lag at POI
  - Synchronous resources could meet the .95 lead/lag requirements at POI
  - Requirements are equivalent
- FERC Order 661a specified requirements for asynchronous resources must be met at the POI

# Point of Interconnection requirement

- ISO carefully considered requests to allow meeting either asynchronous or synchronous requirements
- System reliability requires that the specified amount of reactive support be provided at the POI
- POI requirement is due to differences in various tie line lengths, system configurations, transformer designs and potential for multiple resources connecting to POIs
- ISO has to be prepared for 50% RPS and increasing penetration of asynchronous resources
- Determined ISO must ensure delivery of required support to POI and resources may meet requirements by compensating electrically

# Additional compliance options studies

- Stakeholders recommended the ISO include collective compliance and beyond-the-POI solutions into regular TPP and interconnection study process
- ISO is not proposing changes to add these type of studies to TPP or interconnection study process
- Developers can propose beyond the POI projects in the TPP if identified themselves
- ISO will not preclude collective solutions or negotiated non-conforming LGIAs

# FINANCIAL COMPENSATION

Chris Devon

# Capability compensation

- ISO previously considered developing financial compensation for reactive power capability
- ISO believes that capability for reactive power support by all resources is a good utility practice
- ISO is not proposing any form of payment for reactive power capability

# Capability compensation (cont.)

- Voltage support requirements are necessary for the reliable operation of the transmission system
- Supports the delivery of real power from generation to loads which allows those resources to participate in ISO markets
- Uniform requirements on all new asynchronous resources will not present a significant incremental cost and will level the playing field for all new resources



# Provision compensation

- ISO explored potential enhancements to payment compensation mechanisms for reactive power provision
- ISO investigated potential for more market based procurement and compensation for voltage support
- Determined changes were impractical
- ISO is not proposing any changes to existing provision payment methodology

# Resources with non-typical reactive power capabilities

- Resources with clutches; other resources with capability to operate in synchronous condenser mode; solar resources at night; wind turbines below max output
- These resources are “out of the money” in the energy market optimization but are still providing a service to the ISO without being eligible for current opportunity cost payments
- ISO explored methods to utilize and compensate resources to provide reactive power support while they are not producing real power

# Previously proposed exceptional dispatch category

- ISO previously identified possible need to create a new Exceptional Dispatch (ED) category for these purposes
- Compensation mechanism intended to address the lack of any opportunity cost based provision payment available under the current provision payment structure
- Stakeholder comments presented many important considerations and ISO determined additional details must be addressed
- No longer proposing new ED category at this time

## Previously proposed exceptional dispatch category (cont.)

- Proposed requirements only require resources provide capability for reactive support at real power output levels above zero
- Must determine what resources eligible and required to respond to ISO ED instructions
- Identifying capabilities and requirement of resources to respond to ISO instruction
- Identify and verify costs incurred by resource types in certain operating configurations to accurately calculate payments

## Previously proposed exceptional dispatch category (cont.)

- Inverter-based storage resources also identified capability for reactive power provision without producing real power
- Storage resources note a need to assure accounting of costs related to pricing and timing of real power utilized by inverter-based storage devices to provide unconventional reactive support
- Would be necessary to properly account for their costs of that type of reactive power provision

## Previously proposed exceptional dispatch category (cont.)

- ISO is concerned necessary development of this aspect will extend the proposed timeline
- The ISO intends to avoid delaying extending reactive power requirements to all asynchronous generators
- For these reasons ISO is no longer proposing to further develop this element of this initiative
- This topic will be addressed in a separate stakeholder initiative in Q2 2016
- The ISO appreciates valuable stakeholder feedback that has been provided

# Cost allocation

- ISO proposes no changes to current cost allocation for payments for the provision of reactive power
- Current cost allocation method has been found to be just and reasonable by FERC
- Stakeholders have previously requested that the ISO consider assigning costs to generators as well as current method of allocating costs to loads and exports
- Impractical to try to identify cost causation by generators as conditions constantly fluctuate
- ISO does not believe it makes sense to revisit the cost allocation methodology for these provision payments

# Next steps

- Stakeholders are welcome to submit written comments by **December 3, 2015** to [InitiativeComments@caiso.com](mailto:InitiativeComments@caiso.com)
- Stakeholder comment template has been posted