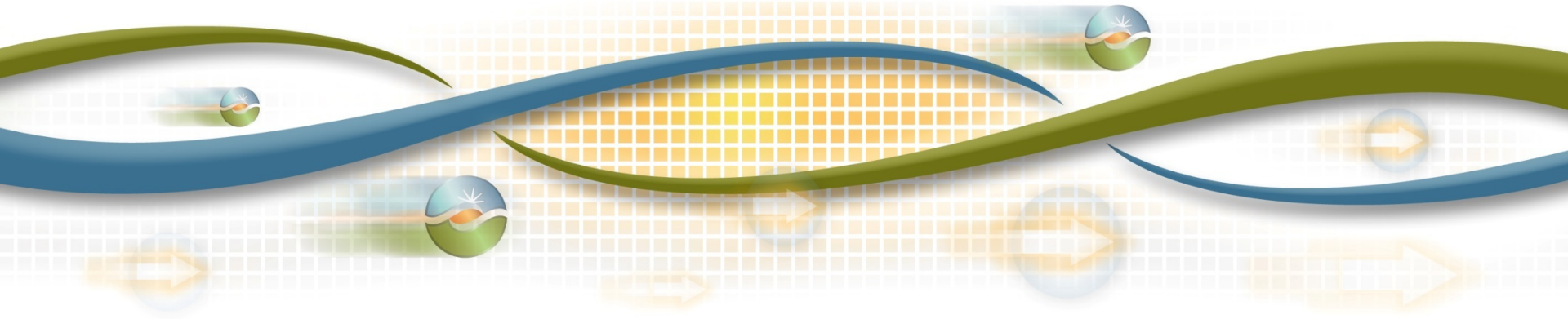
California ISO
Shaping a Renewed Future

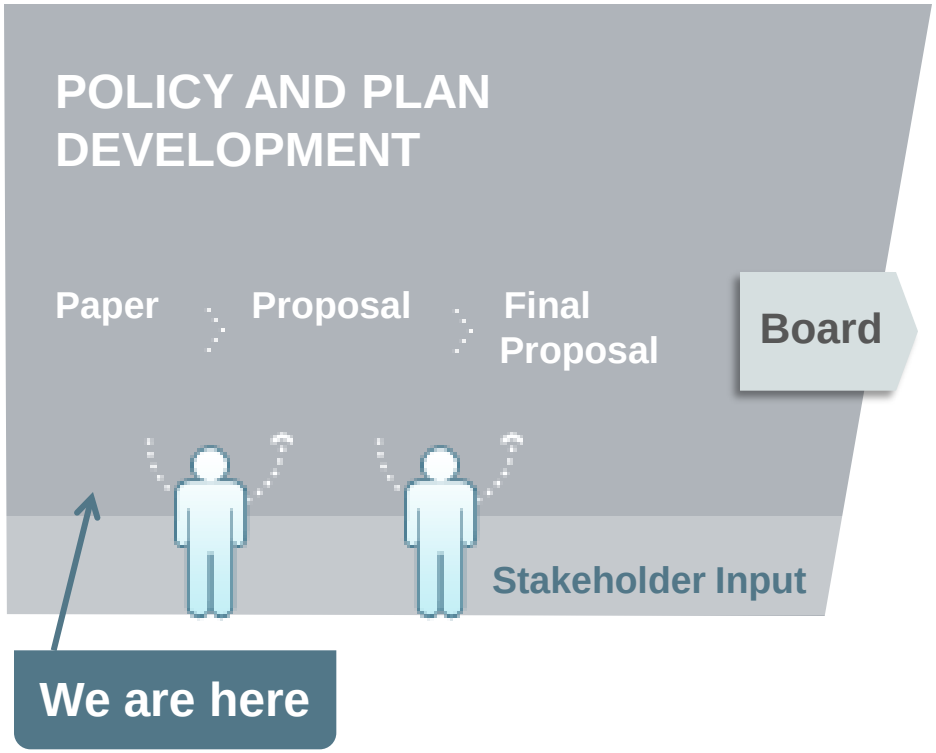
Renewable Integration Market & Product Review – Phase 2

April 12 Stakeholder Meeting

Greg Cook – Director of Market & Infrastructure Policy
Lorenzo Kristov – Principal, Market & Infrastructure Policy
Margaret Miller – Manager of Market Design & Regulatory Policy
John Goodin – Lead, Demand Response
Don Tretheway – Senior Market Design & Policy Specialist



ISO Stakeholder Initiative Process



Renewable Integration Phase 2 - Agenda

Time	Topic	Presenter
10:00 – 10:05	Introduction	C. Kirsten
10:05 – 10:30	Objectives and Roadmap	G. Cook
10:30 – 12:00	Pay for Performance Regulation	J. Goodin A. Ott (PJM) via teleconference
12:00 – 1:00	Lunch Break	
1:00 – 2:00	Existing Market Constraints & New Products	D. Tretheway
2:00 – 2:45	Intra-Hour Scheduling and Enhancements to Existing Market Design	M. Miller
2:45 – 3:00	Break	
3:00 – 3:30	Cost Allocation Issues	L. Kristov
3:30 – 4:00	Wrap-up & Next Steps	J. Goodin

Environmental policy supporting renewable integration is driving changes to the supply fleet which will result in:

- New operational challenges
- Changes to spot market prices and revenues
- Need for new transmission infrastructure

The RIMPR initiative was launched in July 2010 to address necessary market design changes

- Phase 1 addresses near term operational needs and will conclude with Board meeting in June 2011
- Phase 2 initiated with today's meeting and will address medium and longer term market design changes

The ISO envisions two objectives for Phase 2:

- Create comprehensive roadmap by December 2011 that includes:
  - Vision for market end state
  - Plan for getting there through a logical staged process for development and implementation
- Identify specific market design changes that can be completed by end of 2011/early 2012

After discussion today and receipt of stakeholder comments we will post an issue paper that provides:

1. Preliminary outline draft of proposed comprehensive roadmap
2. Discussion of high priority topics identified for resolution in late 2011 or early 2012

Stakeholders should comment on proposed plan, priority for addressing issues and any missing issues that should be identified

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Pay for Performance Regulation

Renewables Integration Market and Product Review Phase 2

John Goodin

Market Design & Regulatory Policy

April 12, 2011

Background

- ISO 20% RPS study clearly identified the need for additional regulation capacity
- ISO has been committed to explore enhancements to regulation in phase 2
- FERC NOPR on Frequency Regulation

FERC Notice of Proposed Rulemaking (NOPR) on Frequency Regulation

Why did FERC issue the NOPR?

- *To address potential undue discrimination in the procurement of regulation service in organized wholesale electricity markets*
- *Ensure market rules do not present barriers to all resource types providing ancillary services*

FERC posits:

- Faster ramping resources provide more Area Control Error (ACE) correction than slower ramping resources
- Netting regulation energy does not recognize the greater ACE correction faster ramping resources provide

FERC Notice of Proposed Rulemaking (NOPR) on Frequency Regulation

What is FERC proposing?

- Two-part Payment
  - Capacity Payment
    - Cross-product opportunity cost
    - Inter-temporal opportunity cost
  - Performance Payment
    - Mileage payment
    - Accuracy adjustment

Two-part Payment - Capacity Payment

Cross product opportunity cost

- Payment reflects cost of not participating in energy market
- ISO co-optimizes energy and A/S, so resources within an A/S region earn the marginal resource's opportunity cost, which also reflects cross-product opportunity cost

Inter-temporal opportunity cost

- The value a resource forfeits to provide regulation due to less flexibility to charge/discharge advantageously through the energy market
- Not incorporated into ISO market design and new constraints would have to be modeled
- Need input on cost/benefit and how to model

Two-part Payment - Performance Payment

Mileage payment

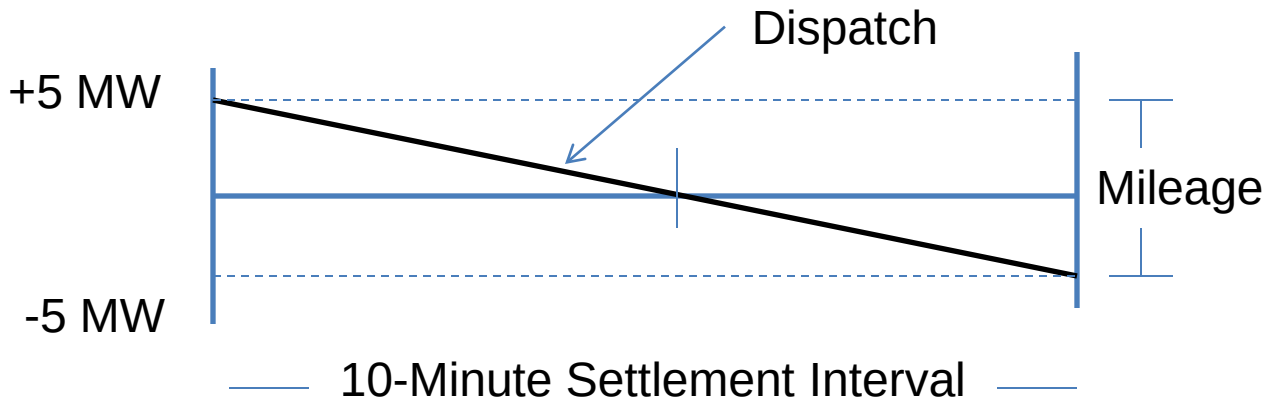
- Compensate for the work performed by a regulating unit
- Absolute value of up and down movement of a regulation resource multiplied by a $/MW-ACE correction price
- ACE Correction Price
  - FERC preference is a market bid for ACE correction; establish admin price if market bid is unworkable

Accuracy adjustment

- Using telemetry, adjust the mileage payment based on how well a resource tracks the ISO AGC signal
- Mileage payment multiplied by accuracy factor
- How are these concepts woven into the ISO market?

Net Energy

- With a performance payment, FERC questions whether net energy payments should be retained, being replaced by a mileage payment for ACE correction provided



Net Energy = 0 MWh

Mileage = 10 MW

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New Products and Existing Operational Constraints

Donald Tretheway
Senior Market Design and Policy Specialist

April 12, 2011

Emerging Operational Needs / Potential Spot Products

- Pay for Performance Regulation (NOPR)
- System Inertia and Frequency Response (Study July 2011)
  - Sufficient rotating mass to arrest frequency decline and/or enough governor response to stabilize system
- Load Following Reserve (20% Study)
  - Existing fleet has sufficient capability
  - However, 20% study did indicate that enhancements to how the fleet is managed may be necessary
- Flexible Ramping Nomogram (Current Operational Need)
  - Additional discussion to follow

Constraints added to ensure market outcomes address existing operational requirements

- Minimum Online Commitment (MOC) Constraint (Implemented)
  - Minimum commitment of specific resources in a defined area to maintain reliability
  - Implemented for three operating procedures previously addressed through Exceptional Dispatch plus as needed to address specific outages
- Flexible Ramping Nomogram (Pending)
  - Constraint to ensure sufficient ramping capability between HASP/RTPD and 5 min dispatch is committed
  - Designed to support load and supply variation and uncertainty

Process for implementation and evaluation of operational constraints needed to maintain reliability

1. Identify operational need for new constraint consideration

2. Implement constraint to ensure reliability

3. Monitor to determine market impact

4. If appropriate, develop spot market product or other compensation mechanism (local RA requirement, pay shadow price)

Flexible Ramping Nomogram Implementation

- Target implementation date May 31, 2011
- While constraint has ability to support up and down requirement initially only upward requirement will be enforced; downward requirement would require more evaluation
- Enforced in RTPD and RTD (non-binding intervals)
- Interval requirement and shadow price will be published for information purposes

Summary

- Operational studies to identify future needs to maintain the grid reliability
- Operational constraints needed and implemented to manage the fleet's resources better
- Process to assess market impact of operational constraints

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Modifications to Intra Hour Scheduling & Other Market Design Enhancements

Margaret Miller

Manager, Market Design & Regulatory Policy

Renewable Integration Phase 2 Stakeholder Meeting

April 12, 2011

Shorter market intervals closer to real-time could be beneficial for all resources

- Establish schedule by which to measure deviations closer to real-time
- Provide ISO more opportunities to re-optimize dispatch of resources in response to changes to load and supply
- Address existing issues with diverging HASP-RTD prices & associated uplift

Several options can be considered

- Full Hour-Ahead Market
  - Move from two settlement to three settlement system
  - May be overly complex solution to problem
- 15 minute market for all resources
  - Would require coordination with external balancing authorities to facilitate changing reservation rules

Decision to modify intra-hour scheduling will impact design of new products so it is important to define end state

Other changes to market design can provide the ISO with additional operational flexibility

- Hourly contingency election for operating reserves
  - Currently daily flag
- Multi-Settlement System for Ancillary Services
  - Provide opportunity for market participants to buy-back and sell AS closer to real-time
- Changes to RUC
  - Evaluate methodology regarding wind and solar output used in RUC
  - Simultaneous RUC/IFM

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Allocation of Integration Costs

Lorenzo Kristov

Principal, Market & Infrastructure Policy

Renewable Integration Phase 2 Stakeholder Meeting

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Integrating VER into grid operations is expected to drive several types of cost increases.

- Increased procurement of regulation
- Greater operational demands on conventional resources (more starts, more ramping)
- Increased need for flexible, dispatchable capacity
- Potentially higher uplift charges
- Increased capacity payments to supplement declining market prices and revenues

Fundamental questions to address in this initiative:

- Should integration costs be allocated directly to VER?
- If so, what objectives and principles should guide the cost allocation design?
  - Cost causation
  - Incentives for investment in technologies that enable VER to manage their own variability and reduce impacts on grid operation
- What cost allocation methodologies should be used?

Some more detailed design questions to address:

- Which specific integration costs to allocate to VER
- Appropriate cost sharing between VER and demand
  - Ancillary services costs
- Allocate cost generically based on resource type, or based on measured performance?
- If allocation is based on measured performance, should costs be allocated to all resource types based on the same measures?
- Focus cost allocation on real-time operational and spot market costs, or consider other vehicles for allocating integration costs, e.g., GIP

Wrap up

Timeline

- April 29- comments due
- Late June 2011- Publish issue paper and roadmap
- July 2011- Stakeholder comments due

Comments Should Address:

- The topics discussed, the roadmap for phase 2, and the priority of issues to be addressed short, mid and long-term
- Issues that must be addressed by year end/early 2012
- Other issues not discussed but should be considered in the phase 2 roadmap

Submit comments to: phase2ri@caiso.com