California ISO
Shaping a Renewed Future

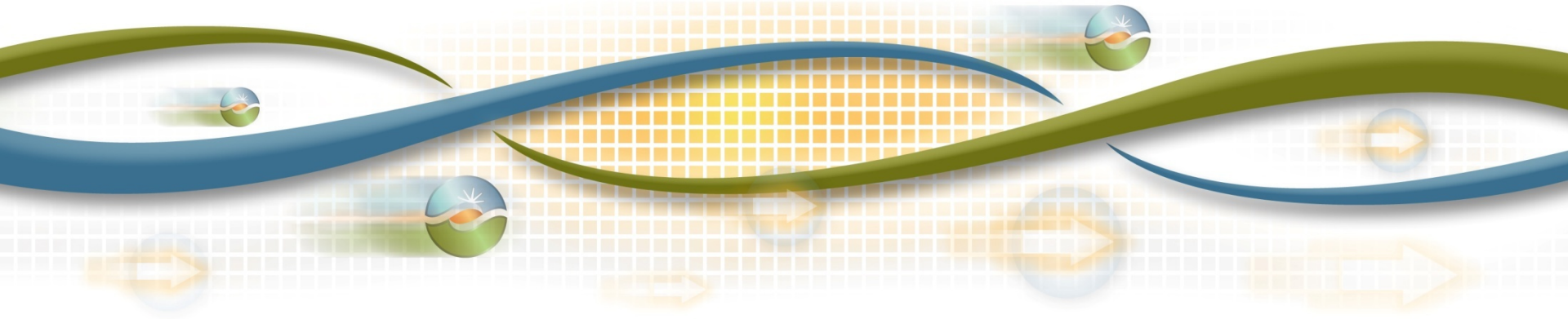
Flexible Resource Adequacy Criteria and Must-Offer Obligation

Market Surveillance Committee Meeting

January 16, 2014

Karl Meeusen, Ph.D.

Market Design and Regulatory Policy Lead



Overview of fifth revised straw proposal

- Technology agnostic flexible capacity offer obligations based on system needs
- All components of the flexible capacity requirement calculated using monthly top five 3-hour net-load change observations
  - Better accounts for variability in the time of day of intermittent resources' ramp
- Other changes
  - Backstop procurement of flexible capacity priced at the CPM rate
  - Three items deferred to a subsequent initiative
    - Standard flexible capacity product
    - Opportunity cost for start-up and minimum load costs
    - Substitution rules for flexible capacity resources

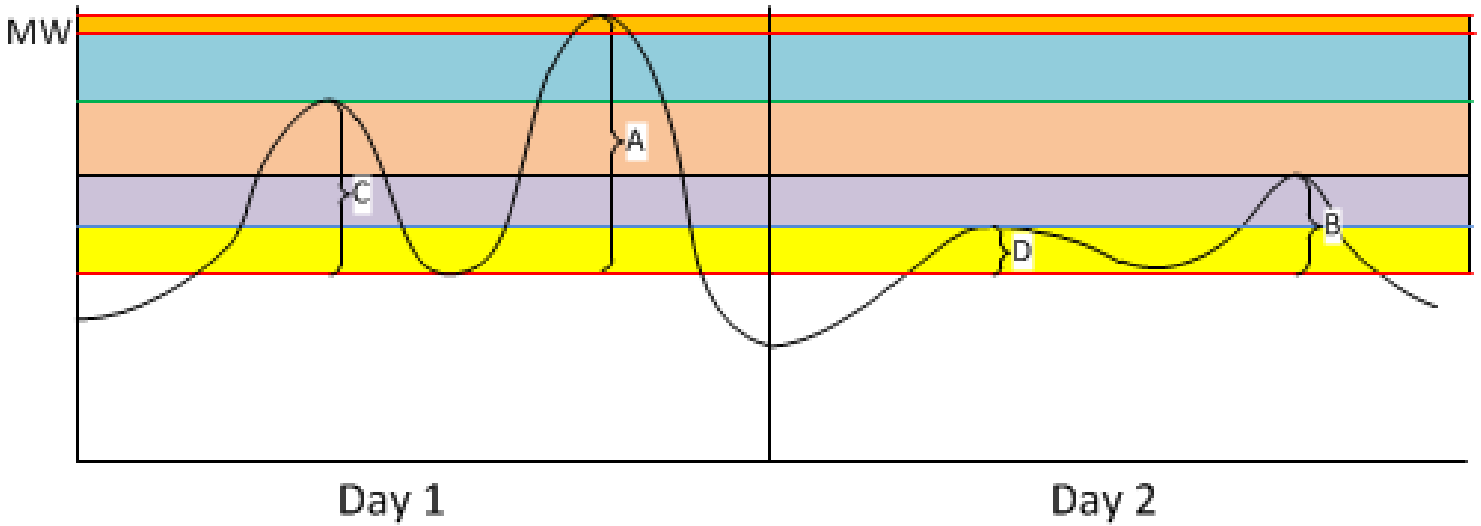
Why the need for changes from the technology specific offer obligations

- Technology specific offer obligations were designed to provide feasible solutions for a wide range of resources including DR, storage, and VERs
- Stakeholders asserted that technology based offer obligations were
  - Not based on system requirements
  - Complex
  - Discriminatory

Defining the various flexible capacity requirement categories

- Two parts to defining needs
  - Define categories
  - Specifying quantities in each category

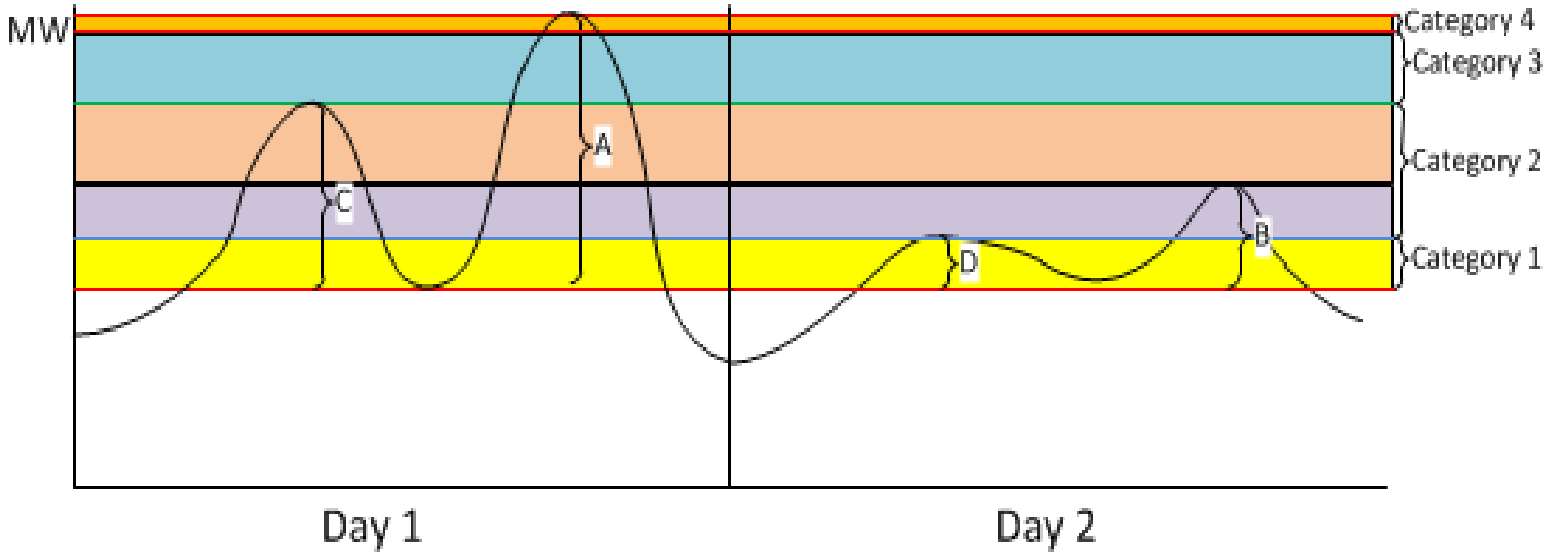
Categorizing the 3-hour net-load ramping needs



- A: The maximum 3-hour net-load ramp for a month
- B: The smallest daily maximum daily 3-hour net-load ramp in a month
- C: The largest secondary 3-hour net-load ramp of the month (i.e. the largest ramp on days that have bimodal ramping)
- D: The smallest secondary 3-hour net-load ramp in a month

Ramps are representative of publically available net-load forecast data

Flexible capacity categories allow LSEs to meet flexible capacity requirements with differing resource availabilities



Category 1: Set at smallest secondary 3-hour net-load ramp in a month

Category 2: Set at difference between smallest secondary 3-hour net-load ramp in a month and largest secondary 3-hour net-load ramp of the month

Category 3: Set at difference between largest secondary 3-hour net-load ramp of the month and 95% of maximum 3-hour net-load ramp for a month

Category 4: Set at 5% of maximum 3-hour net-load ramp for a month

The categories can provide lower cost solutions to meeting flexible capacity requirements and allow a broader portfolio of resources to provide flexible capacity

- The ISO has developed these categories acknowledging not all resources are available all the time
  - i.e. Categories are a relaxation to the 3-hour net-load ramping requirement, not additional requirements to the max 3-hour ramp
- The must-offer obligation for a resource corresponds to the category in which it is shown

Proposed offer-obligations associated with each category

- Category 1:
  - Flexible capacity available for dispatch for all hours from 5:00 a.m. through 10:00 p.m. (i.e. must submit economic bids)
  - *Cannot* be a use-limited resource.
- Category 2:
  - Flexible capacity available for dispatch for all hours from 5:00 a.m. through 10:00 p.m.
  - *May* be a use-limited resource
    - Must have the ability to start at least twice a day
    - Must be able to provide equivalent of six hours of energy at EFC

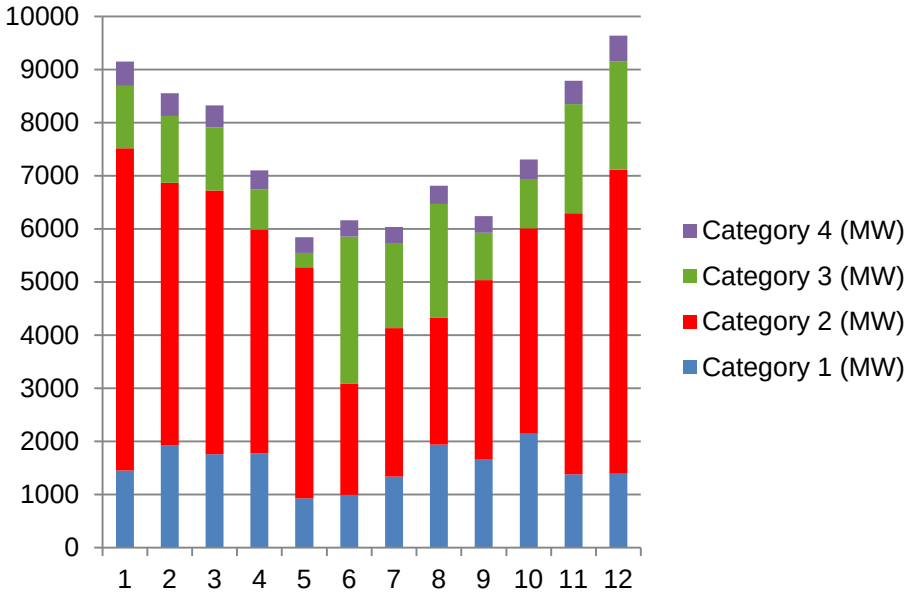
Proposed offer-obligations associated with each category

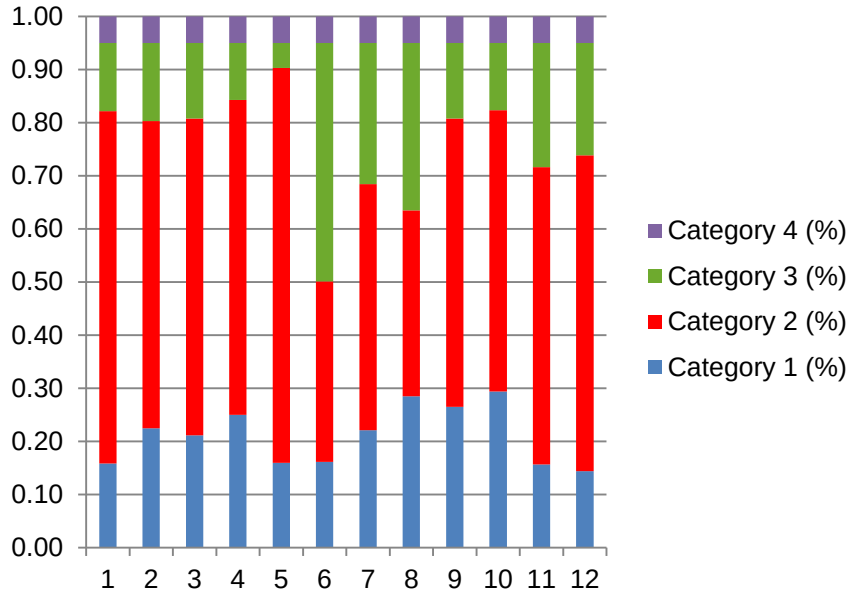
- Category 3:
  - Flexible capacity available for dispatch for five hours per day
    - The specific set of hours determined seasonally
  - *May* be a use-limited resource.
    - Must have the ability to start at least once a day
    - Must be able to provide three hours of energy

Proposed offer-obligations associated with each category

- Category 4 (two options):
  - Option 1 – Energy resources
    - Flexible capacity available for dispatch at least five hours per day.
      - The specific set of hours determined seasonally
    - Ability to start at least once per day
    - Able to provide three hours of energy
    - Able to respond to at least 5 market dispatches per month
  - Option 2 – Regulation energy management resources
    - Must be available to provide regulation from 5:00 a.m. - 10:00 p.m. daily

Monthly minimum capacity requirements for category 1 and maximum capacity limits for categories 2-4 (2014 forecast)





Allocation of flexible capacity requirement to LRAs is split into its two component parts

- Maximum of the Most Severe Single Contingency or 3.5 percent of forecasted coincident peak
  - Allocated to LRA based on peak-load ratio share
- The largest 3-hour net-load ramp is decomposed into four components to determine the LRA's allocation

  Allocation* =

  Δ Load – Δ Wind Output – Δ Solar PV – Δ Solar Thermal

  * Changes in DG component captured in Δ Load

ISO's proposed allocation methodology

- Δ Load
  - LSE's average contribution to load change during top five daily maximum three-hour net-load ramps within a given month from the previous year x total change in ISO load.
- Δ Wind Output, Δ Solar PV, Δ Solar Thermal
  - LSE's average percent contribution to changes in output during the five greatest forecasted 3-hour net load changes x ISO total change in output during the largest 3-hour net load change

SCE's concern with previous allocation proposals

Allocations with DER PV netted with Load

	2015 Share Calculations			
	Load	Wind	Solar	
Month			PV	Thermal
Dec	65%	2%	25%	7%
Jan	61%	6%	25%	7%
Feb	64%	8%	20%	8%
Mar	56%	2%	33%	9%
Apr	51%	4%	35%	10%
May	50%	0%	37%	13%
Jun	90%	23%	-12%	0%
Jul	98%	20%	-18%	0%
Aug	129%	4%	-18%	-15%
Sep	84%	16%	0%	0%
Oct	52%	4%	34%	10%
Nov	62%	1%	29%	8%
Avg.	72%	8%	15%	5%