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Flexible Resource Adequacy Criteria and Must-Offer Obligation

January 23, 2014

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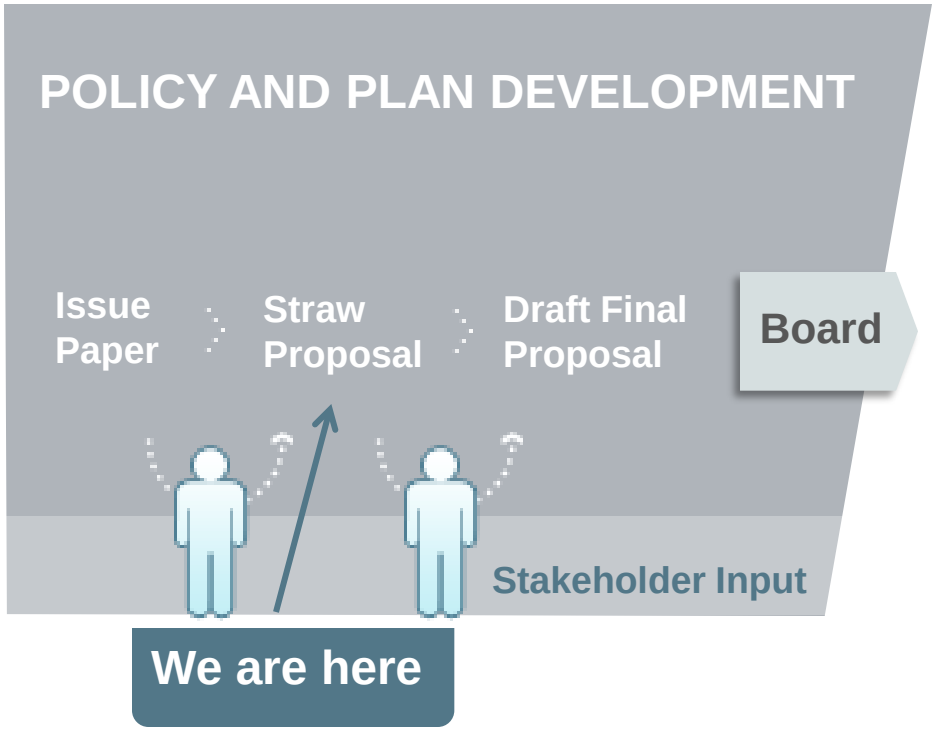
Market Design and Regulatory Policy Lead

Stakeholder Meeting – Agenda – 1/23/14

Time	Topic	Presenter
10:00 – 10:05	Introduction	Tom Cuccia
10:05 – 10:15	Overview and Meeting Objective	Karl Meeusen
10:15 – 10:45	Proposal for Allocating ISO System Flexible Capacity Requirements	
10:45 – 11:15	Defining the ISO's Flexible Capacity Categories	
11:15 – 11:30	Break	
11:30 – 12:30	Defining the ISO's Flexible Capacity Categories (cont.) and Flexible Capacity Category Must-Offer Obligation	Karl Meeusen
12:30 – 1:30	Lunch	
1:30 – 2:30	Flexible Capacity Category Must-Offer Obligation	Karl Meeusen
2:30 – 2:45	Break	
2:45 – 3:15	Flexible Capacity Category Must-Offer Obligation (cont.) and Deferred Items: Standard Flexible Capacity Product, Opportunity Costs, and Replacement/Substitution	Karl Meeusen
3:15 – 3:30	Next Steps	Tom Cuccia

ISO Policy Initiative Stakeholder Process



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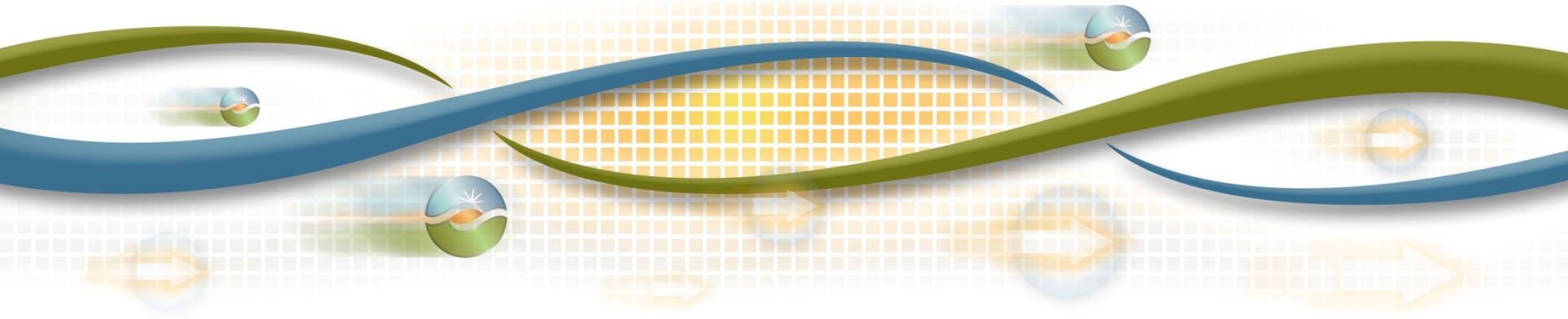
Flexible Resource Adequacy Criteria and Must-Offer Obligation: Fifth Revised Straw Proposal



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Overview and Meeting Objectives

Initiative scope includes ISO tariff changes to address ISO system flexible capacity requirements

- Stakeholder process targeted to be completed by February 2014 for 2015 and 2016 RA Compliance
- Current initiative scope includes:
  - Flexible capacity categories and associated must-offer obligations
  - Flexible capacity requirement process and timeline
  - System flexible capacity requirement allocation to LRAs
  - Requirements to make flexible capacity RA showings to the ISO
  - ISO Backstop procurement authority for flexible capacity deficiencies

The ISO will defer some elements of the original scope to a subsequent stakeholder initiative

- The ISO will defer the following FRAC-MOO elements, completing the policy for these elements during 2014 and implementing these provisions in 2016:
  - The “flexible standard capacity product”
  - Minimum load and start-up opportunity cost bidding for gas-fired use-limited resources providing flexible capacity
  - Replacement and substitution provisions

The ISO has made several changes from the Fourth Revised Straw Proposal

- 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
    - Δ Wind Output, Δ Solar PV, and Δ Solar Thermal contributions will be done using forecasted data
    - Δ Load will use historic contribution
- LRA contribution to flexible capacity need will be based on specific RPS portfolios submitted to the ISO

The ISO has made several changes from the Fourth Revised Straw Proposal

- The ISO will require two RA showings for month-ahead and year-ahead RA showings:
  - System and local capacity and
  - Flexible capacity
    - Resources need not be on both showings
- The development of four distinct technology agnostic flexible capacity categories and accompanying must-offer obligations
  - Categories are derived from a needs-based approach of the flexible capacity categories needed to reliably operate the system

The ISO has made several changes from the Fourth Revised Straw Proposal

- Backstop procurement of flexible capacity will be priced at the CPM rate
- The ISO defer final development of the items listed below to later in 2014 for implementation in fall of 2015 for the 2016 resource adequacy compliance year:
  - Standard Flexible Capacity Product
  - Use-limited Resources – Opportunity Cost Methodology
  - Substitution rules for resources on forced outage

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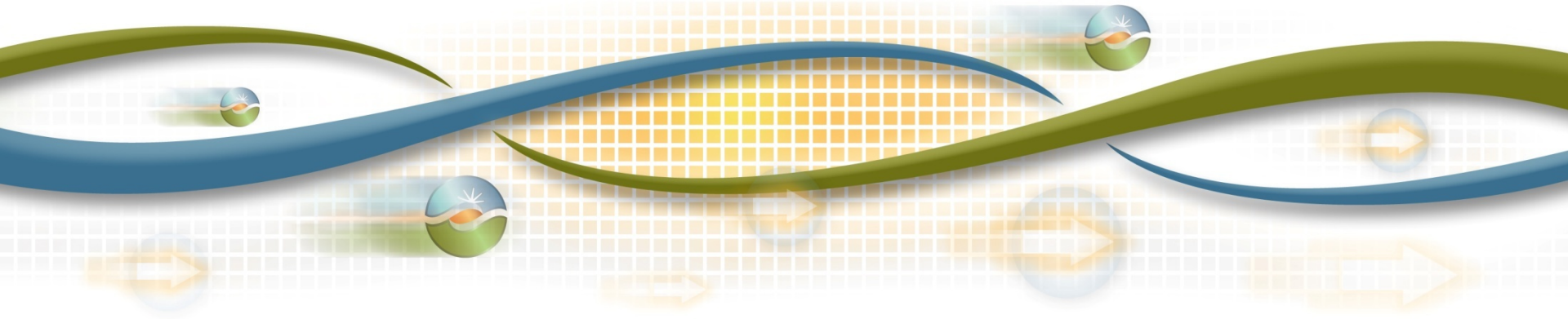
Process and Study Methodology for Determining Flexible Capacity Procurement Requirements



Flexible capacity requirement assessment process including the error term

January

- Receive CEC load forecast used for TPP expansion plan
- Receive updated RPS build-out data from the LSEs
- Publish annual FCR assumptions paper

February

- ISO stakeholder meeting to discuss assumptions Stakeholder comments, and posting of comments with ISO response

March

- Draft LCR and FCR study completed followed by Local & flexible capacity needs stakeholder meeting
- Publish draft final LCR & FCR needs study (including the error term)

April

- ISO stakeholder meeting to discuss LCR / FCR results followed by stakeholders comments

May/June

- Final 2014 LCR & FCR study posted
- CPUC proposed and final annual RA decision incorporating LCR and FCR procurement obligations

July

- LSEs receive Year-Ahead obligation

August

- Revised load forecasts and renewable build-outs for following RA compliance year

September

- LSEs receive revised RA and flexible capacity obligation
- Final NQC and EFC Lists issued by the ISO

October

- Year-ahead showing of system, local, and flexible capacity (show 100% local and 90% system and flexible)

Monthly Showings

- T-45 days: Month-ahead showings, including local and flexible true-up
- T-25 days: ISO notifies LSEs and suppliers of any deficiencies of system, local, and or flexible capacity
- T-11 days: Final opportunity for LSEs to demonstrate to the ISO that any identified deficiencies have been cured

The specific study assumption will be considered in the ISO's annual flexible capacity requirement assessment

- The flexible capacity requirement assessment will consider:
  - Load forecasts
  - Renewable portfolio build-outs
  - Production profiles for intermittent resources
  - Load modifying demand side programs (i.e. DR not bid into the ISO and impacts of dynamic rates)

ISO flexible capacity requirement calculation

- Methodology

$$\text{Flexibility Requirement}_{MTHy} = \text{Max}[(3RR_{HRx})_{MTHy}] + \text{Max}(MSSC, 3.5\% * E(PL_{MTHy})) + \varepsilon$$

Where:

$\text{Max}[(3RR_{HRx})_{MTHy}]$ = Largest three hour contiguous ramp starting in hour x for month y

E(PL) = Expected peak load

MTHy = Month y

MSSC = Most Severe Single Contingency

ε = Annually adjustable error term to account for load forecast errors and variability

Flexible capacity counting rules

Start-up time greater than 90 minutes

EFC = Minimum of (NQC-Pmin) or (180 min * RRavg)

Start-up time less than 90 minutes

EFC = Minimum of (NQC) or (Pmin + (180 min – SUT) * RRavg)

Where:

EFC: Effective Flexible Capacity

NQC: Net Qualifying Capacity

SUT: Start up Time

RRavg: Average Ramp Rate

The ISO looked at the implications of this EFC counting for other resource

- The 3-hour counting criteria can be applied
  - Solar (both PV and thermal)
  - Wind
  - Demand response
  - Long discharge storage resources
- The EFC for storage resources electing the regulation energy management would be set at the lesser of
  - Resource's 15 minute output capability or
  - NQC

The ISO will require two RA showings for month-ahead and year-ahead RA showings

- LSE's must provide RA showings for:
  - System and local capacity and
  - Flexible capacity
- Resources can be on one or both showings
  - A resource can be shown as flexible and not count towards meeting a generic RA requirement
  - Resources shown only on the flexible capacity RA showing will be subject to the flexible capacity provisions but not the generic RA provisions

The ISO use flexible capacity showings in several validation processes

- Flexible capacity showings will be used to:
  - Validating resource is eligible to provide flexible capacity in a given category
  - Allocating costs in the event of cumulative deficiency
  - Comparing flexible capacity RA showings with resources RA supply plans to ensure resource has sold flexible capacity

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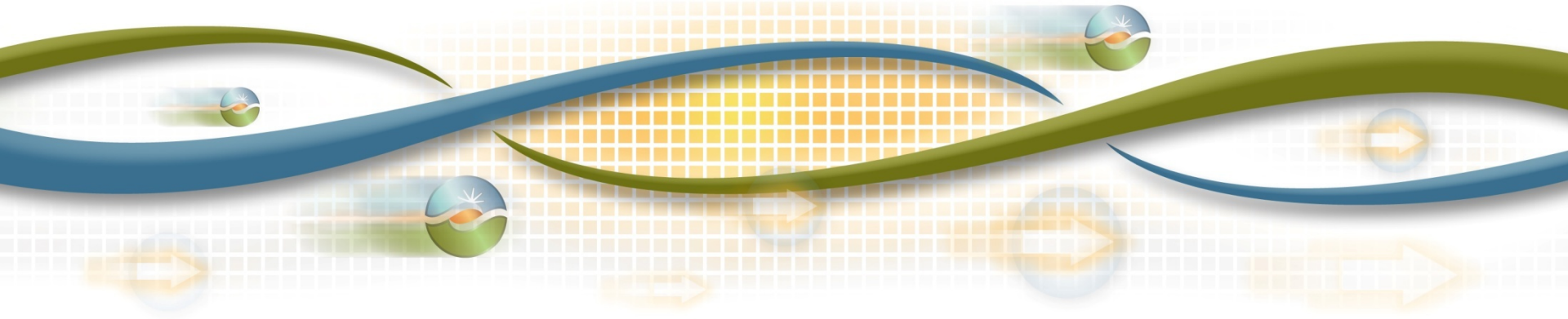
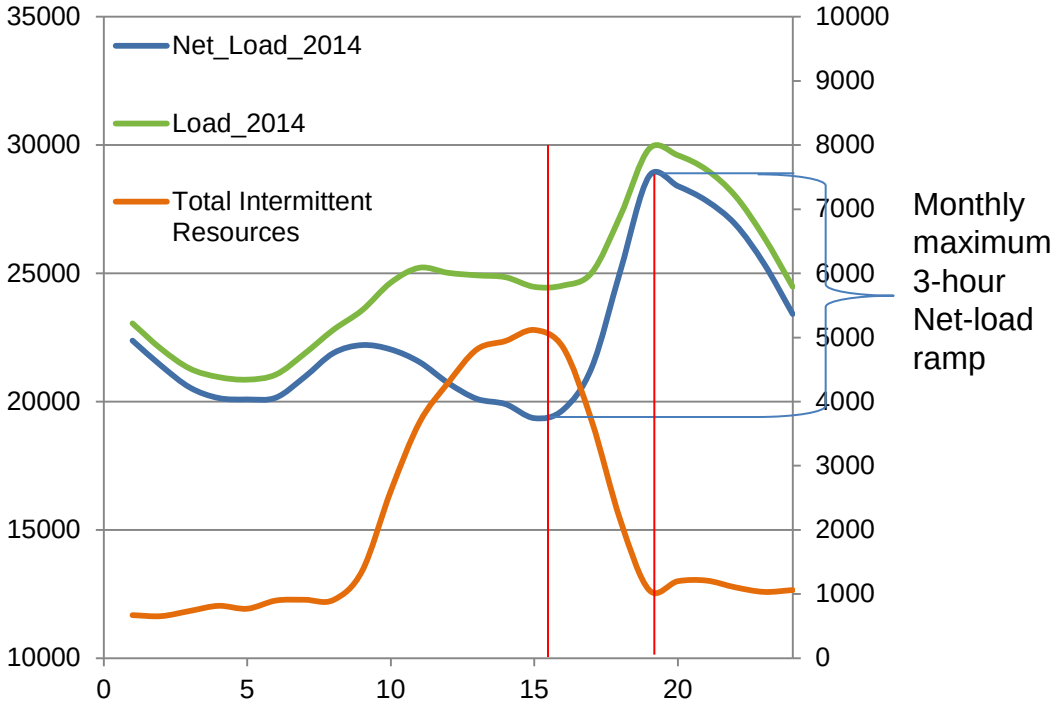
Proposal for Allocating ISO System Flexible Capacity Requirements



Allocating flexible is based on contribution to system's monthly maximum 3-hour net-load ramp

- 3-hour maximum net-load ramp used is the coincident 3-hour maximum net-load ramp
  - Not each individual LSE's or LRA's maximum 3-hour ramp
- ISO must assess the proper level of granularity to use when determining each LSE's contribution to requirement
  - Reach an equitable allocation at a reasonable cost

Forecasted Load and Net load Curves: January 15, 2014



Flexible capacity requirement is split into its two component parts to determine the allocation

- 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

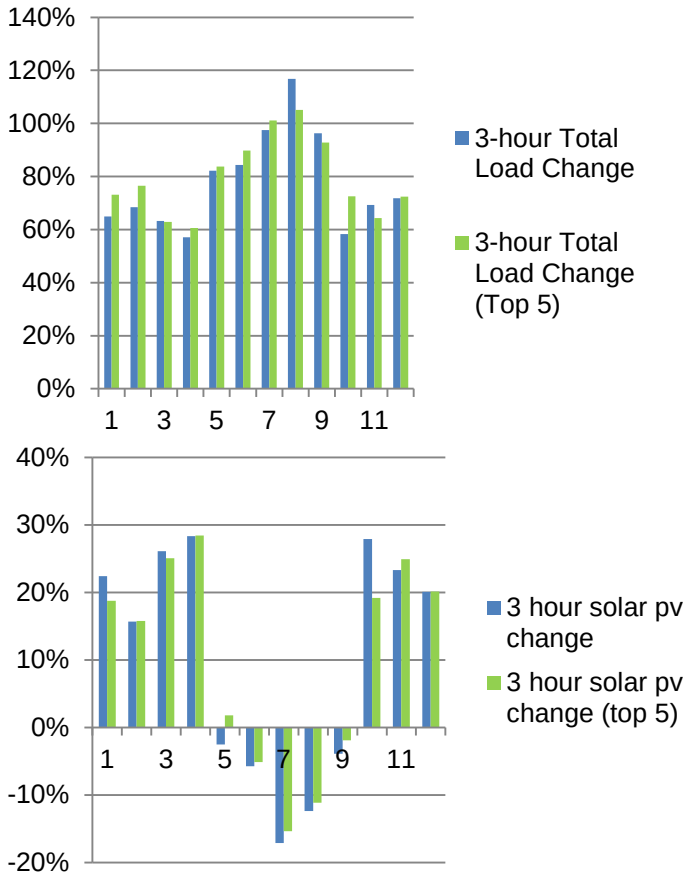
  * Changes in DG component captured in Δ Load

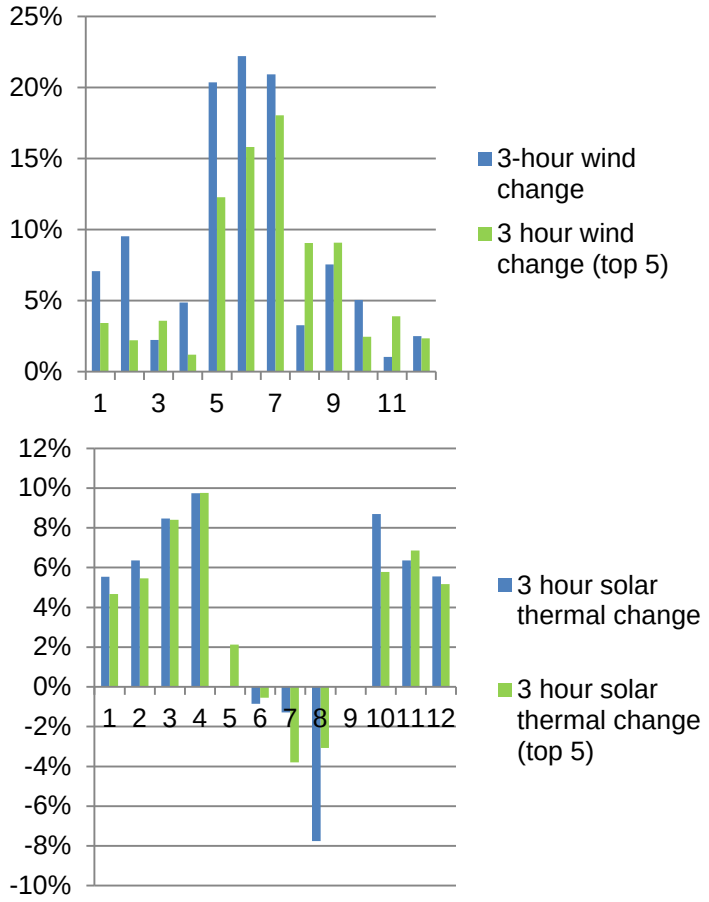
  ** The determination of Δ Load is the only changed component from the previous proposal

All components of the flexible capacity requirement should be allocated based on an LRA's specific contribution to top five peak three-hour net-load ramps

- Flexible capacity needs are determined based on 3-hour net-load change, therefore contribution of each component will also be measured based contribution to largest 3-hour net-load changes
- Current proposal differs from previous proposal in two ways
  - The ISO will allocate flexible capacity requirements based on specific RPS portfolios submitted for the flexible capacity requirements assessment
  - All components will be based on top five three hour net-load changes
    - Δ Wind Output, Δ Solar PV, and Δ Solar Thermal contributions will be done using forecasted data
    - Δ Load will use historic contributions

Using the contribution the top five 3-hour net-load ramps smoothes seasonal changes of each component*





*All results found using 2014 forecasted net-load data

The ISO will not propose seasonal allocations at this time

- Not clear that seasonal similarities will persist in the future
- Easier to move to seasonal allocations in the future if trends continue than to unwind seasonal allocations if changes are required
- The ISO may reconsider seasonal allocations in a future stakeholder initiative

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Defining the ISO's Flexible Capacity Categories and Flexible Capacity Category Must-Offer Obligation

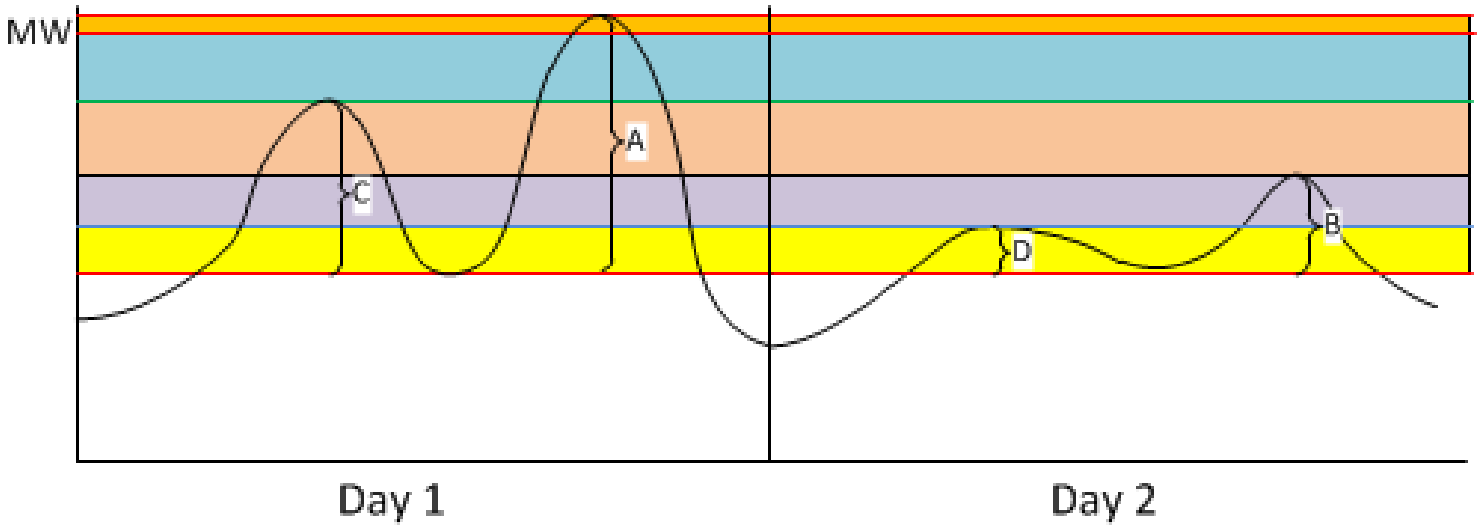
Why the need for changes from the technology specific offer obligations

- 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

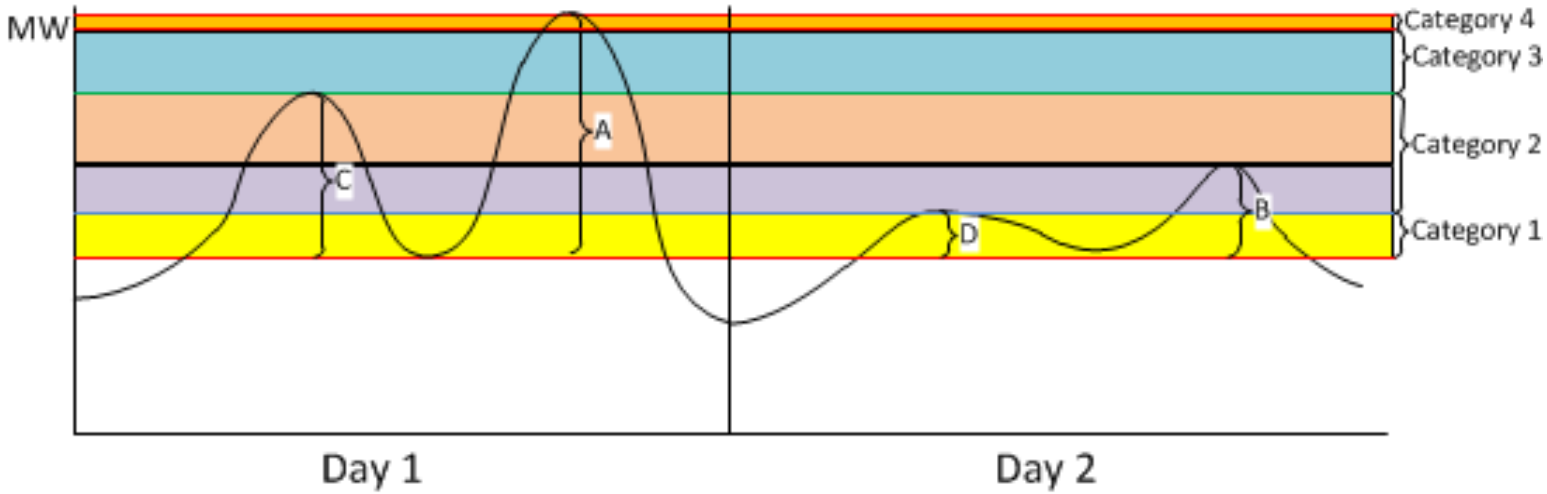
Categorizing the 3-hour net-load ramping needs



- 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 (Unlimited Flexibility): Set at smallest secondary 3-hour net-load ramp in a month

Category 2 (Limited Flexibility): 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 (Peak Flexibility): 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 (Super-Peak Flexibility): 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 need to be are available for flexibility needs all the time
  - i.e. Categories are a relaxation ~~to~~ of 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 (Unlimited Flexibility):**
  - 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 (Limited Flexibility):**
  - 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

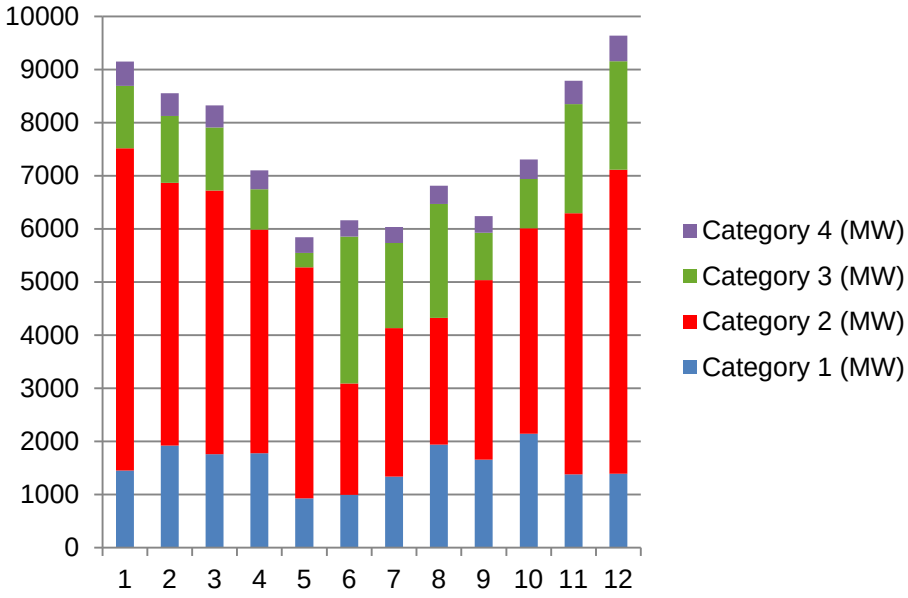
Proposed offer-obligations associated with each category

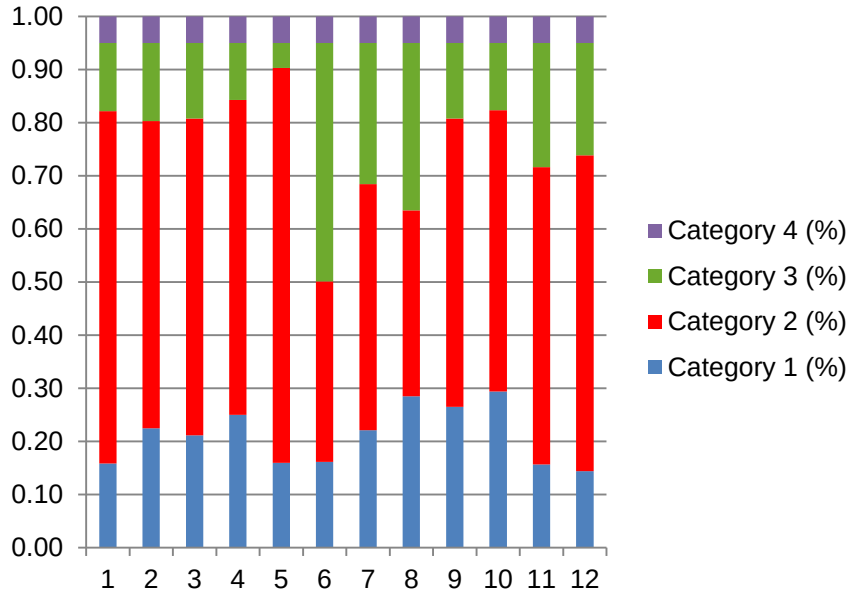
- **Category 3 (Peak Flexibility):**
  - Flexible capacity available for dispatch for five hours per day
    - The specific set of hours determined seasonally
  - *May* be a use-limited resource.
    - Must have the ability to start at least once a day
    - Must be able to provide three hours of energy

Proposed offer-obligations associated with each category

- **Category 4 (Super-Peak Flexibility) (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)

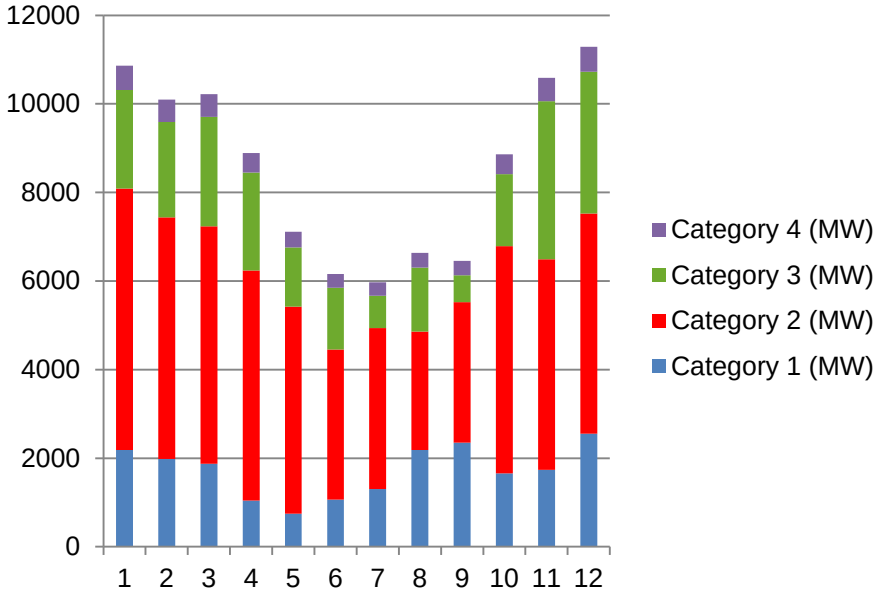


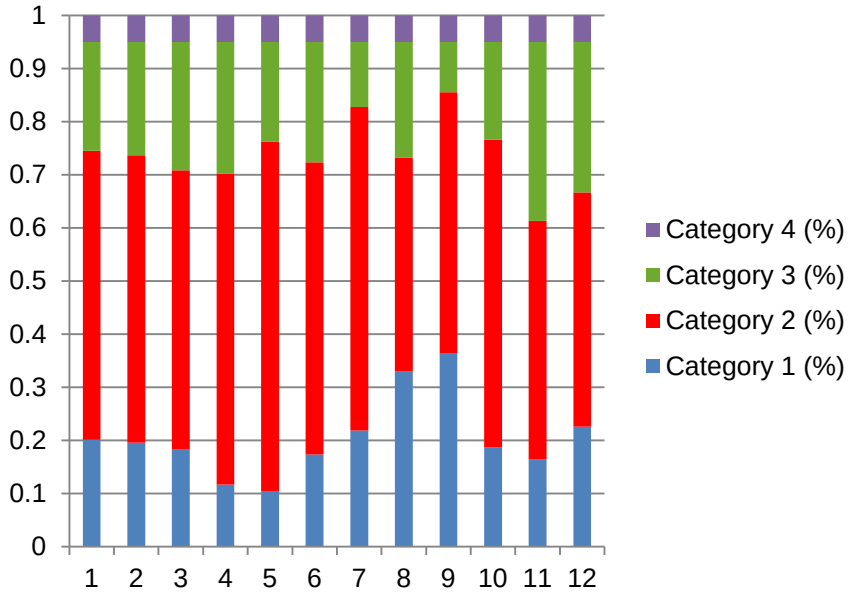


Category 2 can be used to meet cumulative quantities for categories 2, 3, and 4 requirements

Category 3 can be used to meet cumulative quantities for categories 3 and 4 requirements

Monthly minimum capacity requirements for category 1 and maximum capacity limits for categories 2-4 (2016 forecast)





Category 2 can be used to meet cumulative quantities for categories 2, 3, and 4 requirements

Category 3 can be used to meet cumulative quantities for categories 3 and 4 requirements

The addition of the categories does not necessitate changes to the ISO's proposed allocation methodology

- The ISO looked at LRAs' contributions to each category to determine if a more complicated allocation methodology is warranted and more consistent with causation principles.
  - Preliminary analysis to determine if additional granularity was required to account for LRAs' contributions to each category
- Preliminary assessment does indicate a significant difference between the ISO proposed allocation methodology and one that examines a specific LRA's contribution to each
  - As such, the proposed allocation methodology is consistent with the causation principles

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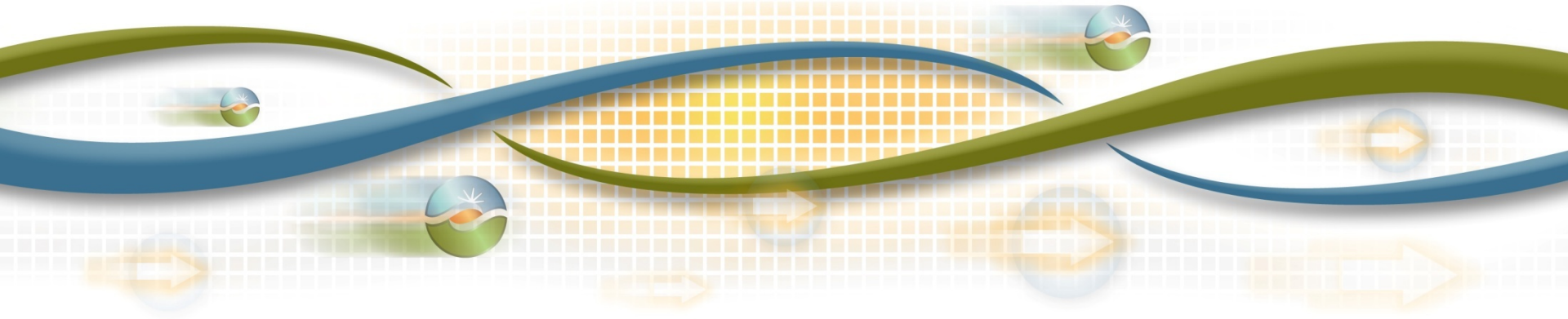
Proposed Flexible Capacity Backstop Procurement Authority



New backstop procurement authority to address deficiencies in an LSE's flexible capacity requirement

- ISO proposes backstop procurement authority that allows for backstop designations when:
  - An LSE has insufficient flexible capacity in either its annual or monthly Resource Adequacy Plan and
  - There is an overall net deficiency in meeting the total system annual or monthly flexibility requirements
- Any backstop procurement will charged at the prevailing CPM price
  - LSE will have 30 days to cure any deficiencies

Backstop procurement costs will be allocated to deficient LSE's SC within a deficient LRA

- The ISO will defer to LRAs to determine how flexible capacity categories are allocated to jurisdictional LSE
  - The ISO will use LRA's allocation methodology to assess an LSE's cost responsibility
- The ISO will use the proposed allocation methodology as a default measure of compliance with each category unless and LRA establishes another method for allocating the requirements

Reliability Services Initiative will ultimately be the initiative where primary backstop procurement mechanism is designed

- Would provide market based mechanism to procure flexible capacity shortfalls
- Will likely have to maintain mechanism similar to CPM for more limited circumstances
- Compliments adder method by providing market based value for flexible capacity

The ISO will defer further development of several components to a subsequent stakeholder initiative

- Standard Flexible Capacity Product
  - Included value of flexible capacity availability
- Opportunity cost bidding for start-up and minimum load costs for conventional use-limited resources
  - ULR required to submit economic bids for their flexible capacity category into the real time market consistent with applicable use-limitations
- Substitution and replacement rules for flexible capacity resources on planned or forced outages
  - Existing substitution and replacement rules for generic capacity will still apply

Next Steps

- Comments on straw proposal
  - Due January 31, 2014
  - Submit comments to fcp@caiso.com
  - Draft Final Proposal February 7, 2014

- Board of Governors
  - March 2014