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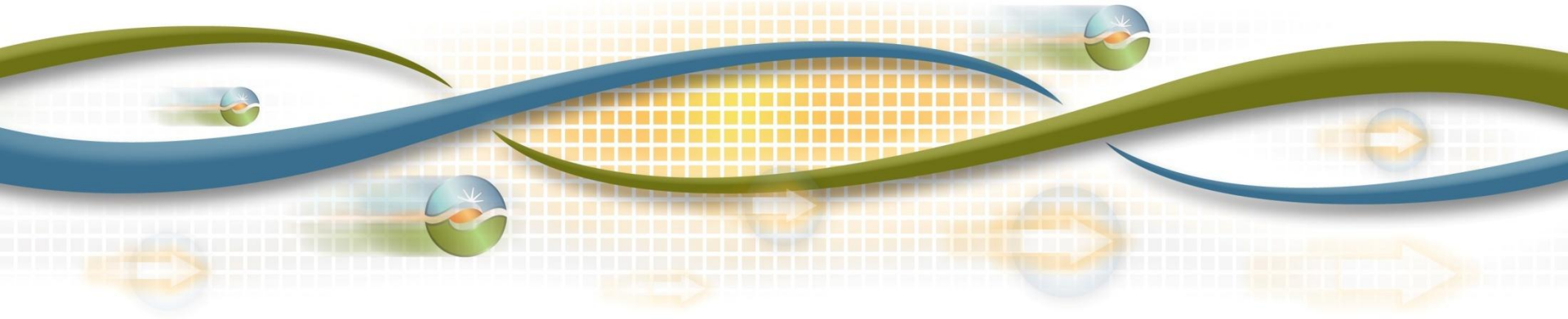
# Flexible Resource Adequacy Criteria and Must-Offer Obligation

October 9, 2013

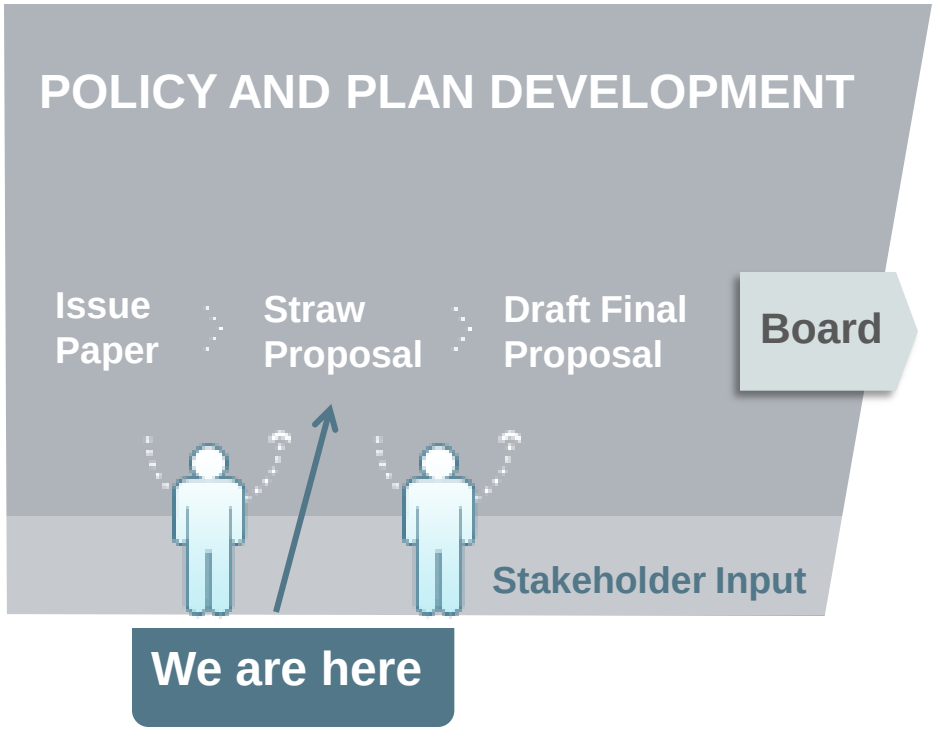
Karl Meeusen, Ph.D.
Market Design and Regulatory Policy Lead



# Stakeholder Meeting – Agenda – 10/09/13

| 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 – 12:15 | Flexible Capacity Must-Offer Obligation | Carrie Bentley |
| 12:15 – 1:15 | Lunch | |
| 1:15 – 2:45 | Flexible Capacity Availability Incentive Mechanism: Standard Flexible Capacity Product | Karl Meeusen |
| 2:45 – 3:00 | Break | |
| 3:00 – 3:50 | Proposed Flexible Capacity Backstop Procurement Authority | Karl Meeusen |
| 3:50 – 4:00 | Next Steps | Tom Cuccia |

# ISO Policy Initiative Stakeholder Process



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

Karl Meeusen, Ph.D.
Market Design and Regulatory Policy Lead

# Overview and Meeting Objectives

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

- Stakeholder process targeted to be completed by December 2013 for 2015 RA Compliance
- Initiative scope includes:
  - ISO study process and methodology to determine flexible capacity requirements
  - Allocation of flexible capacity requirements
  - RA showings of flexible capacity to the ISO
  - Flexible capacity must-offer obligation (availability requirements)
  - Flexible capacity availability incentive mechanism and capacity substitution
  - Backstop procurement of flexible capacity

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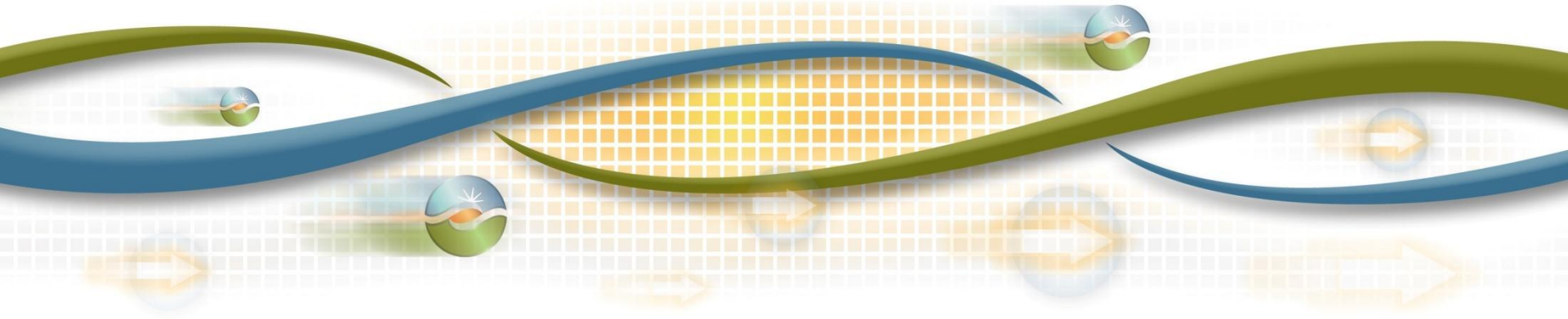
# Process and Study Methodology for Determining Flexible Capacity Procurement Requirements

Karl Meeusen
Market Design and Regulatory Policy Lead



# Flexible capacity requirement assessment process

**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

**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

# Additional flexible capacity counting rules

- MSG resources measured based on 1x1 configuration
- Hydro resource will qualify as flexible capacity for the amount of output its physical storage capacity allows it to provide as energy equivalent for 6 hours
- Demand response resources must be able to provide at least 3 hours of load reduction.
- At this time, intertie resources that are not dynamically scheduled or pseudo-tied into the ISO may not count as flexible capacity resources
  - The ISO may consider the inclusion of intertie resources in a future enhancement

# LSEs will make annual and monthly flexible capacity procurement demonstrations

- LSEs required to demonstrate
  - 90 percent monthly flexibility procurement obligations year-ahead
    - Future needs may require LSEs demonstrate that 100 percent of their flexible capacity has been procured year-ahead
  - 100 percent of flexibility procurement obligation in monthly showing
- Submission to ISO in addition to local regulatory authority
- The ISO is not proposing changes to existing resource adequacy replacement requirement for planned generator outages at this time

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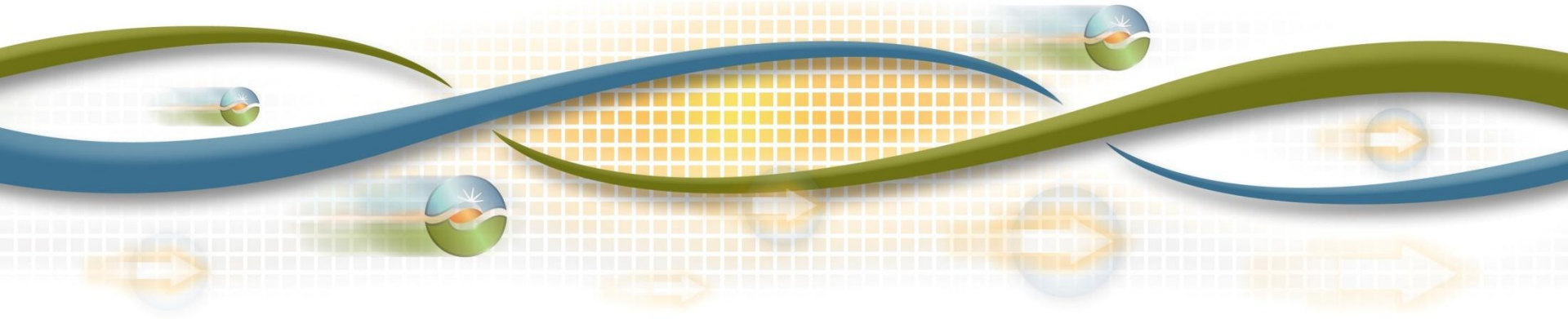
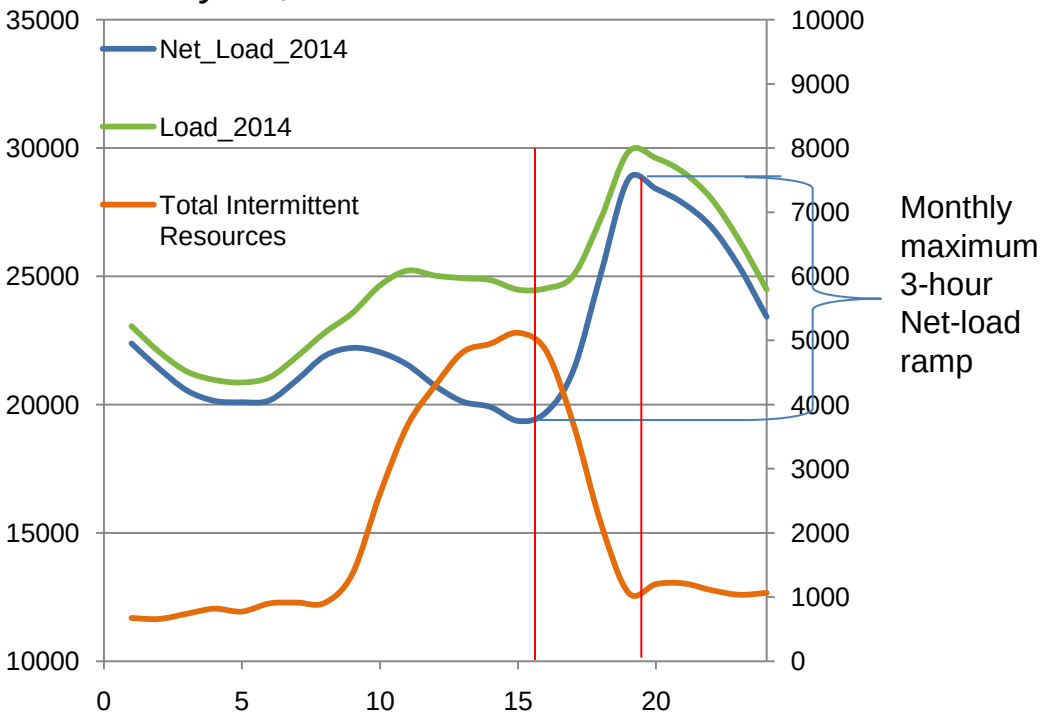
# Proposal for Allocating ISO System Flexible Capacity Requirements



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

- 3-maximum ramp used is the coincident 3-hour maximum 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 maximum 3-hour net load ramp using changes in
  - Load
  - Wind output
  - Solar PV
  - Solar thermal
  - Distributed energy resources

# The ISO will decompose the largest 3-hour net load ramp into five components to determine the LRA's final allocation*

- Δ Load – LSE's percentage of average load change during daily coincident maximum 3-hour load ramps x total change in ISO load
- Δ Wind Output – Percent of total wind contracted x total change in wind output
- Δ Solar PV – Percent of total solar PV contracted x total change in solar PV output
- Δ Solar Thermal – Percent of total solar thermal contracted x total change in solar thermal output

Allocation** = Δ Load – Δ Wind Output – Δ Solar PV
– Δ Solar Thermal

* The ISO is still assessing the feasibility of seasonal allocation factors

** DG component captured in Δ Load

# Calculating Δ Load

- Δ Load – LSE's percentage of average load change during daily coincident maximum 3-hour load ramps x total change in ISO load
  - Daily maximum 3-hour load ramp identified
  - Contribution of each LSE determined for each day as a percent of the total maximum 3-hour load ramp
  - The average contribution for the month is calculated using the daily contribution

# The ISO is still considering other allocation options

- The ISO is still assessing the viability of using
  - Historic average daily maximum 3-hour net-load ramps
  - Time of day system maximum 3-hour load ramps (morning vs. evening ramps)
- Seasonal allocations for all components
  - The ISO is examining the data to assess the homogeneity of LSEs' contributions in each season
    - Would mean 2-4 allocation factors for each component instead of 12

# Flexible Capacity Must-Offer Obligation

Carrie Bentley

Senior Market Design and Policy Specialist

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# Resource adequacy capacity plan designation

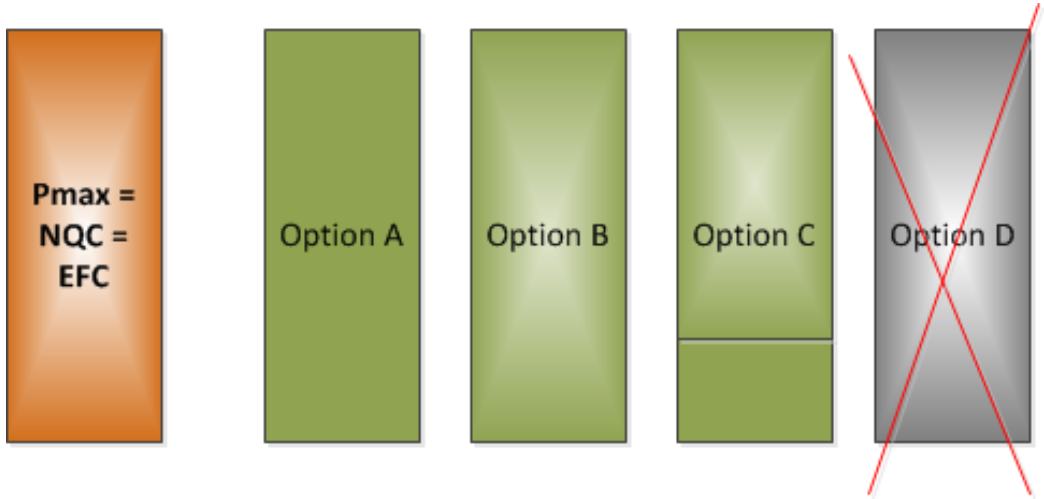
# Resource adequacy plan designations

In a provided resource adequacy plan, the resource can be designated under:

Option A: All capacity is generic RA only

Option B: All capacity is generic **AND** flexible RA

Option C: All capacity is generic and some is flexible




Option D: All capacity as only flexible RA is not possible

# Must-offer obligation (MOO)

# Must-offer obligation topics

1. Flexible resource adequacy capacity
2. Dispatchable gas-fired resources
3. Demand response resources
4. Storage resources
5. Variable energy resources

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# Flexible resource adequacy capacity must-offer rules

# Must-offer obligation for flexible capacity

- Submit economic bids for energy in day-ahead and real-time markets from 5:00AM - 10:00PM
  - ISO optimization will respect daily limitations
- Remain subject to generic RA must-offer obligation from 10:00PM - 5:00AM
- Specialized must-offer rules for:
  - Dispatchable gas-fired resources
  - Demand response
  - Storage
  - Variable energy resources

# Reason for must-offer obligation for flexible capacity

- RA principle: If no other resources are bid into the market, the market should be able to operate using RA resources alone
- Generic RA does not mandate economic bids, which are needed to provide efficient and market-based system flexibility
  - LSEs secure flexible resources to meet net load ramp and load following requirements
  - Flexible ramping product initiative (in progress) will explicitly procure flexible ramping to meet interval to interval system ramping requirements

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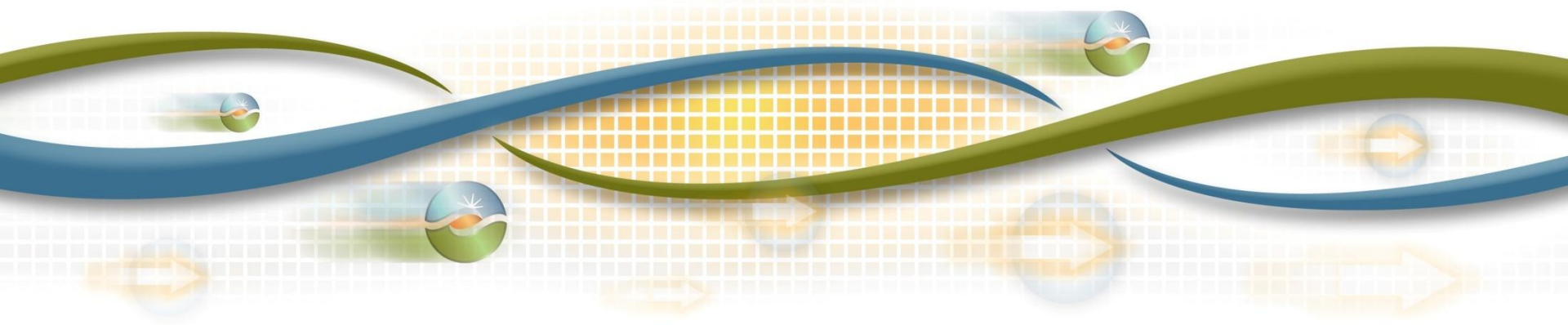
# Must-offer requirements for flexible resource adequacy dispatchable gas-fired use-limited resources



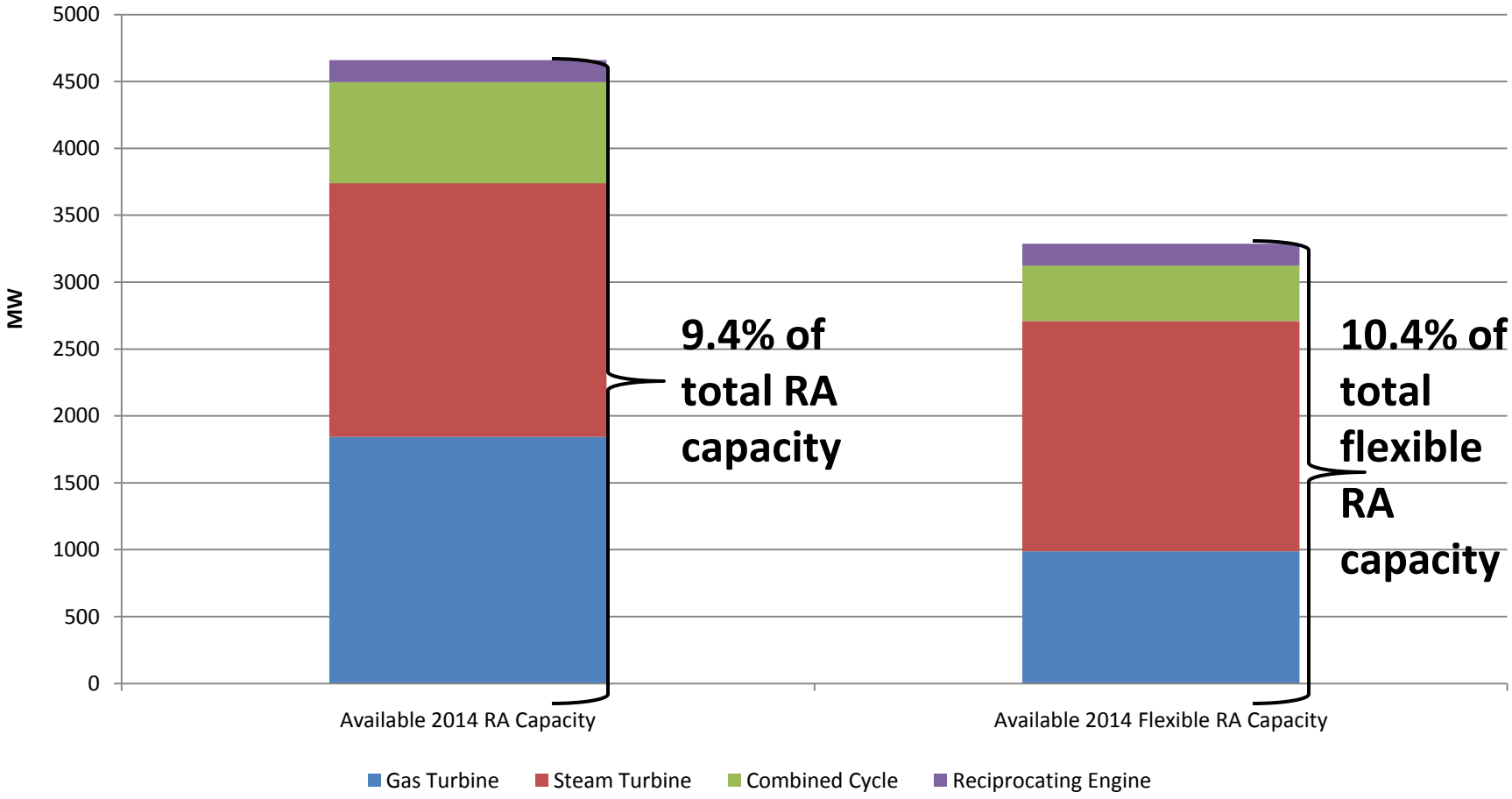
# Dispatchable gas-fire resources must-offer requirements

1. Description of use-limited dispatchable gas-fired resources
2. Use-limited flexible RA rule proposal
3. Opportunity cost methodology
4. Economic withholding
5. Hard stops

# Description: Use-limited dispatchable gas-fired resources

- Resources with monthly or annual physical limitations mandated for environmental reasons by a regulatory entity
- Have a verifiable use-plan filed with the ISO
- Currently, under generic RA rules the ISO relies on the scheduling coordinator to bid in resources when available

# Description: Use-limited dispatchable gas-fired resource capacity



# Proposal: Rules to manage use-limited resources

- Must offer: Submit economic bids into both the day-ahead and real-time markets in all hours from 5:00A - 10:00P
- Market management: Use-limited resources will be given additional control over their start-up and minimum load bid costs in order to manage use-limitations through the market
- Hard stops: Use-limited resources may submit a SLIC ticket, i.e. a “hard stop”
- SFCP: Subject to specialized SFCP rules that will be reviewed in SFCP section

# Proposal: Use-limited must-offer requirement issues

- Proposed: Submit economic bids into both the day-ahead and real-time markets in all hours from 5:00AM - 10:00PM
  Current RA: Manage use by not submitting bids
- Identified challenges with submitting economic bids :
  - The ISO may dispatch the resource at the wrong time and cause the resource not to be available during a high ramping need period
  - Resources may be dispatched in a manner where it is no longer available to economically bid in and therefore would be penalized by the flexible capacity incentive mechanism

# Proposal: Incorporate market based solution

- Allow resources to incorporate an opportunity cost into their start-up, minimum load, and energy bid
  - Allow daily bidding of start-up and minimum load costs up to this amount
  - Allow a monthly registered cost of up to 150% of this amount
- Goal of including opportunity cost is to optimize the resources availability over a month or year
- Goal is not to ensure the resource is available throughout entire must-offer requirement and/or standard flexible incentive mechanism threshold levels

# Opportunity cost methodology: Energy bid costs

- The ISO allows a resource to bid in up to a bid cap of $1,000/MWh and in the event of local market power, is mitigated to its default energy bid
- Current rules allow a resource to establish a default energy bid that reflects the resource's opportunity cost of being dispatched given a limited number of run hours
- Opportunity cost methodology for dispatchable gas-fired use-limited resources revised to include additional constraints

# Opportunity cost methodology: Energy bid cost limitations

- Incorporating the opportunity cost into the energy bid cost without changing rules related to default energy bids, start-up costs, and minimum load costs would result in a less efficient dispatch:
  - Market power mitigation: the current default energy bid opportunity cost methodology only uses a single use-limitation (run hours) so is less accurate
  - Commitment to minimum load: the market optimization may still commit the resource up to minimum load based on start-up and minimum load costs

# Opportunity cost methodology: Start-up and minimum load bid costs

- Current rule: Two options
  (1) Proxy option- calculated daily by the ISO
  (2) Registered option- registered monthly at up to 150% of the proxy cost
- Proposed rule: Three options
  (1) Proxy option- calculated daily by the ISO
  (2) Registered option- registered monthly at up to 150% of the proxy cost plus opportunity cost
  (3) Bid option- bid in daily by scheduling coordinator up to proxy cost plus opportunity cost adder

# Opportunity cost methodology: Proof of concept

- Whether successful dependent on ability to accurately calculate opportunity cost
- ISO testing proof of concept
- If opportunity cost methodology was used in t1, how well would this have worked in t2
  - Uses 2013 data
  - Uses actual resource use-limitations

# Economic withholding

- Economic withholding fundamentally entails bidding above variable costs
- Use-limitations legitimize the incorporation of opportunity cost as a variable cost of production
- Necessary conditions for economic withholding if opportunity cost is incorrect:
  - The opportunity cost is sufficiently high, AND
  - Calculation is controlled by the supplier, AND
  - Leveraged to benefit the suppliers portfolio.

# Hard stops

- A hard stop is essentially going on outage or derate, typically through a SLIC normal card
- There is no bid insertion, so in the day-ahead a resource would only have to not bid in order to not be picked up by the ISO
- In real-time; however, if a resource has a day-ahead schedule, not bidding would cause the day-ahead schedule to become the equivalent of a self-schedule
- Therefore, hard stops will be available for dispatchable gas-fired use-limited resources in the real-time as a means to control production

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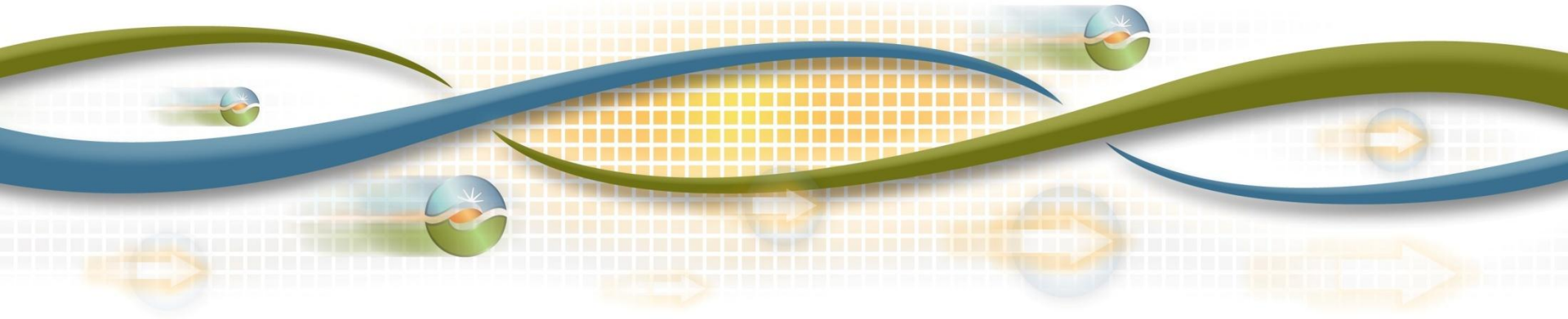
# Flexible resource adequacy demand response must-offer rules



# Demand response must-offer rules

- Must submit economic bids into both day-ahead and real-time markets on all non-holiday weekdays for either,
  - 7:00AM - 12:00PM or  3:00PM - 8:00PM
- Must be able to provide at least 3 hours of load reduction
- Daily limitations can be specified in ISO's Master File

# Demand response bidding rules

- The ISO is not proposing to change the following rules for demand response:
  - Daily limitations will be respected by ISO optimization
  - PDR does not have a start-up or minimum load cost
  - PDR is not subject to local market power mitigation
- Therefore,
  - PDR can manage limitations through energy bids
  - No need to include opportunity cost in start-up or minimum load cost

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# Flexible resource adequacy storage must-offer rules

# Storage must-offer rules

- The ISO proposes that storage resources (excluding pump storage) that provide flexible capacity either:
  1. Submit economic regulation bids for the time period from 5:00am –10:00pm as a regulation energy management resource, or
  2. Select one of the must-offer obligations outlined for demand response resources
- Options are designed to allow the SC of the resource to select the must-offer obligation that works best with the specific storage technology

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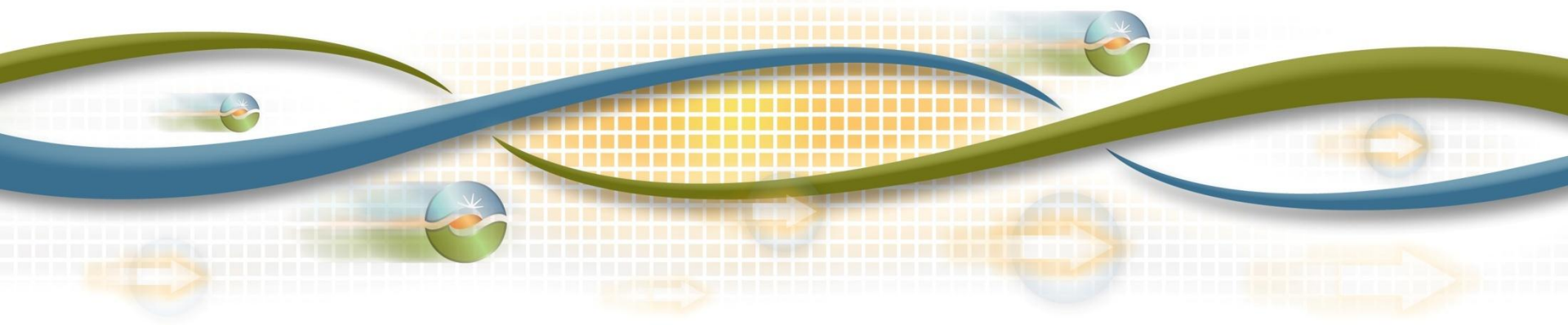
# Flexible resource adequacy variable energy resources must-offer rules



# Variable energy resources must-offer rules

- Not all dispatchable variable energy resources are able to provide flexibility during all hours
  - Solar PV can only provide flexible capacity during the daytime hours
- Setting a flexible capacity must-offer obligation from 5:00am –10:00pm unworkable for these resources
- Specialized must-offer periods for Solar PV, Solar Thermal, and Wind

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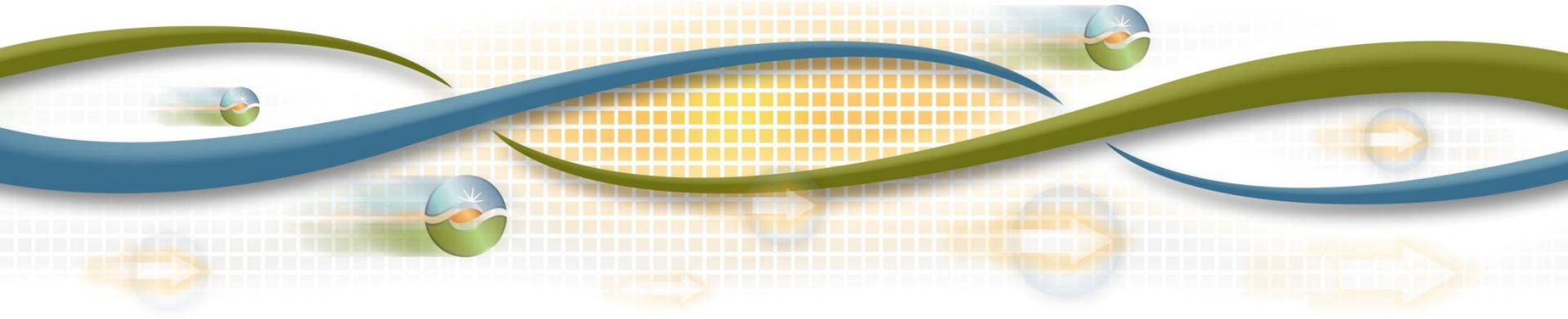
# Flexible Capacity Availability Incentive Mechanism: Standard Flexible Capacity Mechanism (SFCP)

Karl Meeusen
Market Design and Regulatory Policy Lead



# ISO believes an availability incentive mechanism is superior approach to bid insertion rules for flexible capacity

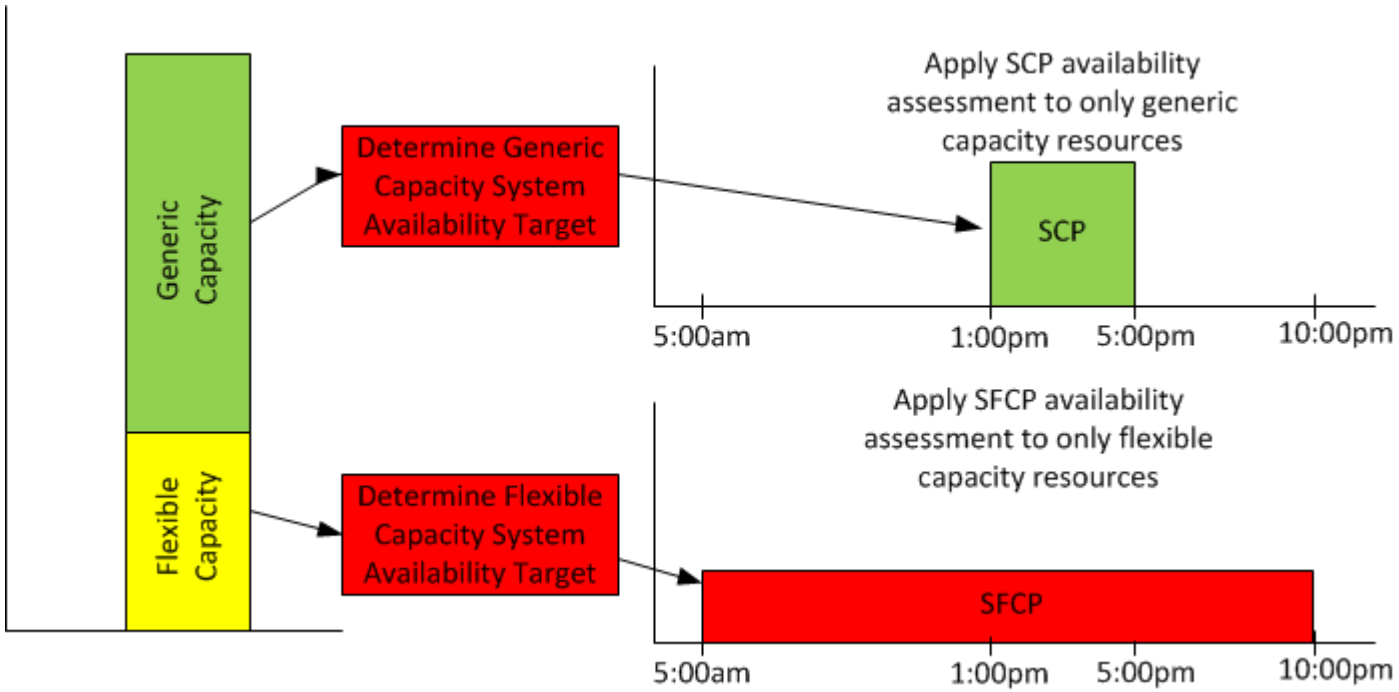
- Availability incentive mechanism (SFCP) based on economic bids
- Compliance with must-offer obligation can be ensured through this mechanism
  - Positive affirmation flexible capacity is available, e.g. demand response bids
  - Allows for use-limitations or need for self-scheduling that market cannot model
- Anticipate implementing no later than the 2016 RA compliance year

# Options considered three primary approaches for the SFCP

- Bucket method: Evaluates the availability of generic capacity and flexible capacity in completely separate "buckets"
- Adder method: Would calculate the SCP and SFCP independently, resources would be subject to/ eligible for an incentive mechanism for both
- Worse-of method: Would calculate the SCP and SFCP independently, but would only charge the resource the worse of the SCP or the SFCP

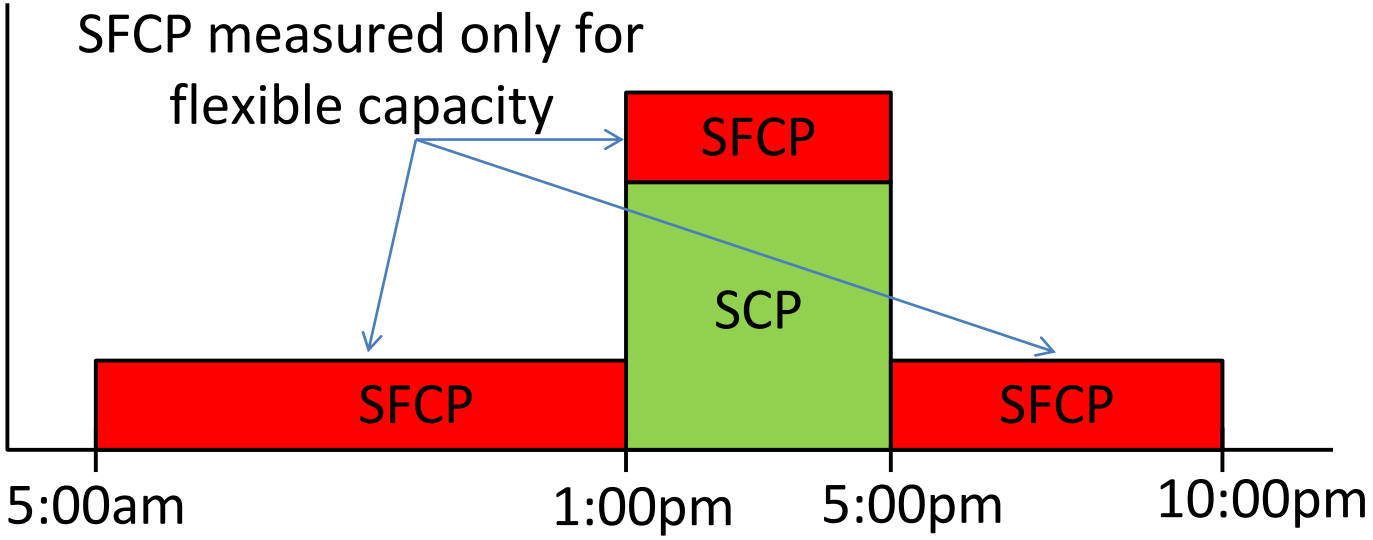
- **The adder method is the ISO's preferred approach**

# Example: The Bucket Method



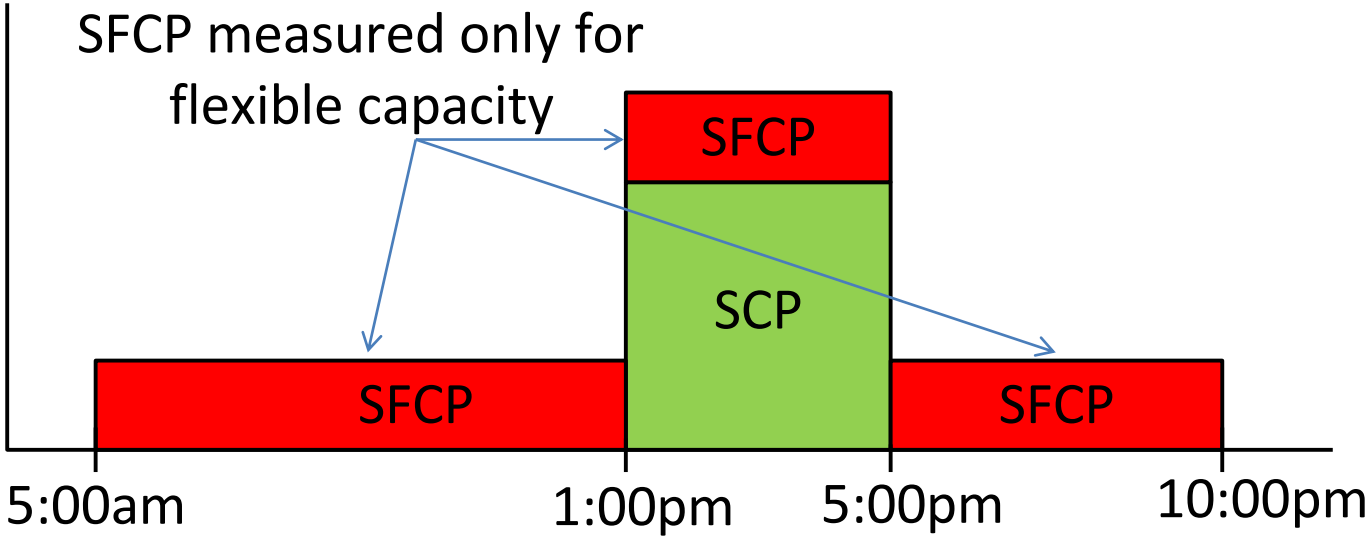

- A MW is either flexible or generic
- If the capacity is flexible, availability is measured only relative to other flexible capacity and only SFCP charge/credits apply
- SCP availability will be assessed relative to only other generic MWs (flexible MWs will be removed from the SCP assessment)

# Example: The Adder Method




- The SCP is measured for all RA capacity and does not consider flexibility capacity availability rules
- The SFCP is measured for only flexible RA capacity and does not consider generic capacity availability rules
- A resource that self schedules would be available under SCP, but not SFCP
- A resource that is on forced outage would be considered unavailable under both the SCP and SFCP
- Resources subject to both SCP and SFC charges

# Example: The Worse-of Method




- The SCP is measured for all RA capacity and does not consider flexibility capacity availability rules
- The SFCP is measured for only flexible RA capacity and does not consider generic capacity availability rules
- A resource that self schedules would be available under SCP, but not SFCP
- A resource that is on forced outage would be considered unavailable under both the SCP and SFCP
- Resources subject only to the greater of the SCP or SFCP charge

# The ISO prefers the adder method

- Most accurately reflects
  - relative values of generic capacity and
  - additional value of flexible capacity
- Subject to less overlap
- More accurate values availability
  - Considers a self-scheduled resource to be available for generic but not for flexible
  - SFCP appropriately value additional benefit of economic over self schedule

# The ISO prefers the adder method (cont.)

- Does not require rules to determine if an outage or derate impacts flexible or generic capacity
  - Resource's bidding activity would demonstrate what portion of the capacity is out
- Can easily be transitioned to use a price signal received from a reliability services auction

# The bucket method

- Treats flexible capacity that is self-scheduled the same as a flexible capacity completely unavailable because of an outage
- Requires explicit provisions that address how outages and derates are counted (i.e. Is affected capacity flexible or generic?)
  - The options include
    - A pro-rata split,
    - The outage/derate would be allocated to one bucket or the other or
    - The SC could choose how the outage/derate is allocated.
- Without explicit rules to allocate outage to flexible or generic capacity, may provide an adverse incentive to report as many outages as possible as flexible capacity outages.

# The “worse-of” method

- Only applies charges for not providing one service, not two
- Splitting the pool of non-availability charges into two pools also reduces the incentives for resources to over-perform relative to the system target for either SCP or SFCP
- Muting performance incentives may reduce the effectiveness of the SCP or SFCP in ensuring resources are available

# Pricing the flexible capacity adder

- Considered three options for setting the flexible capacity adder:
  - The CPM rate
    - Designed to value genic capacity, not clear this is the correct price to value flexible capacity availability.
  - The average $/kw-yr equivalent for the flexi-ramp constraint
    - Extremely wide spread of values depending on the assumptions
  - The publically available CPUC data for RA contract prices
    - Based on prices from CPUC's bilateral capacity market

# The ISO proposes to use the CPUC RA contract price data

- Uses CPUC's 2010 and 2011 RA report (most recent published report)
- Compared the difference between the average price for system capacity with the 85$^{th}$ percentile for ISO system capacity.
  - Assumes lower quality capacity will have a lower price, while newer and higher quality capacity (i.e. more flexible capacity) will receive a slightly higher capacity price

# The ISO proposes to use the CPUC RA contract price data (cont.)

- The difference between these two values is
  - $18.48/kw-yr (2010)
  - $19.44/kw-yr (2011)
- The ISO proposes to start with the 2011 RA data and add a consistent growth factor ($0.96/kw-yr) to account price increases from 2011 to present.
- **The resulting proposed flexible capacity adder is $23.25/kw-yr**

# The funding and incentives for the flexible capacity availability incentive mechanism

- Flexible capacity availability incentive mechanism would be self-funded
  - Resources with availability measurements less than 2.5% of the monthly target charge the applicable flexible capacity backstop price
  - Resources that exceed monthly target flexible capacity availability value plus 2.5% will be credited from these charges based on their performance
  - Initial dead bands will start at +/- 3.5% system target while historic SFCP data is compiled
- Flexible capacity incentive mechanism would not draw funds from the existing SCP

# Flexible capacity availability incentive mechanism must ensure flexible capacity is available in both day-ahead and real-time markets

- Compliance in both day-ahead and real-time markets in each of these markets is important
  - Unit commitments in the day-ahead market
  - System balancing in the real-time market
- ISO proposes use the minimum of the MW of capacity economically bid into the day-ahead or real-time markets
- Measurement based on resource's must-offer obligation
  - For example:
    - Non-use-limited measured on 17 hour availability
    - DR measured on 5 hour availability

# Substitution of flexible capacity on forced outage

- Flexible capacity resources forced out during a month may provide substitute capacity to cover the outage
- Any substitute capacity must be received and approved by the ISO prior to the close  of the IFM
- Must provide substitute capacity to address the loss of both generic capacity and flexible attribute to avoid SCP and SFCP non-availability charges.
  - Substitute for flexible capacity need not come from the same resource that substitute for generic capacity
- If resource on outage is providing local capacity, it will still be required to replace the local capacity

# When SFCP does not apply

- Generally, failure to submit an economic bid for the flexible capacity quantity for any reason will be considered unavailable under SFCP
- The following are exceptions to this rule
  - Long-start resources that are scheduled in the day-ahead market Resources on planned and approved outages
  - Resources that have reached a daily use-limitation
  - Resources that have reached a monthly use limitation, subject to availability thresholds

# The minimum SFCP availability thresholds

- The minimum availability thresholds are
  - Economically bid-in up to that point all of its flexible capacity for at least 90% of Standard Flexible Capacity Product hours,
  - Economically bid in at least 20 days over the month
    - The ISO will consider all outages in determining if a resource has crossed this threshold
    - a resource that is on a planned outage for 15 days would not be able to meet this threshold in a given month
- If both of the conditions are met, then the resource is exempt from the SFCP for the remainder of the month.

# Flexible capacity availability incentive mechanism formula

- The ISO proposes to measure compliance with MOO using the following formula:

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}[Min(MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM, MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM)]}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

# Example 1 of Standard Flexible Capacity Mechanism Calculation

- A resource sells 100 MW flexible capacity for the month of June (510 hours)
- Economically bids 75 MW everyday from 5:00 a.m. through 10:00 p.m.

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}[Min(MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM, MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM)]}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

$$= \frac{75*17*30}{17*30*100} = 75\%$$

# Example 2 of Standard Flexible Capacity Mechanism Calculation

- A resource sells 100 MW flexible capacity for the month of June (510 hours)
- Economically bids 75 MW 25 days from 5:00 a.m. through 10:00 p.m.
- Is on a planned outage for 5 days

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}[Min(MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM, MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM)]}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

$$= \frac{75*17*25}{17*25*100} = 75\%$$

# Example 3 of Standard Flexible Capacity Mechanism Calculation

- A resource sells 100 MW flexible capacity for the month of June (510 hours)
- Economically bids 100 MW 25 days from 5:00 a.m. through 10:00 p.m.
- Is on a forced outage for 5 days

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}[Min(MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM, MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM)]}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

$$= \frac{100*17*25}{17*30*100} = 83.33\%$$

# Example 4 of Standard Flexible Capacity Mechanism Calculation

- A DR resource sells 10 MW flexible capacity for the month of June (80 hours)
- Economically bids 7.5 MW 17 days from 5:00 a.m. through 10:00 p.m.
- Reaches monthly use-limitation after day 18

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}[Min(MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM, MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM)]}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

$$= \frac{7.5*5*18}{5*18*10} = 75\%$$

# The interaction of SCP and SFCP in the adder methodology

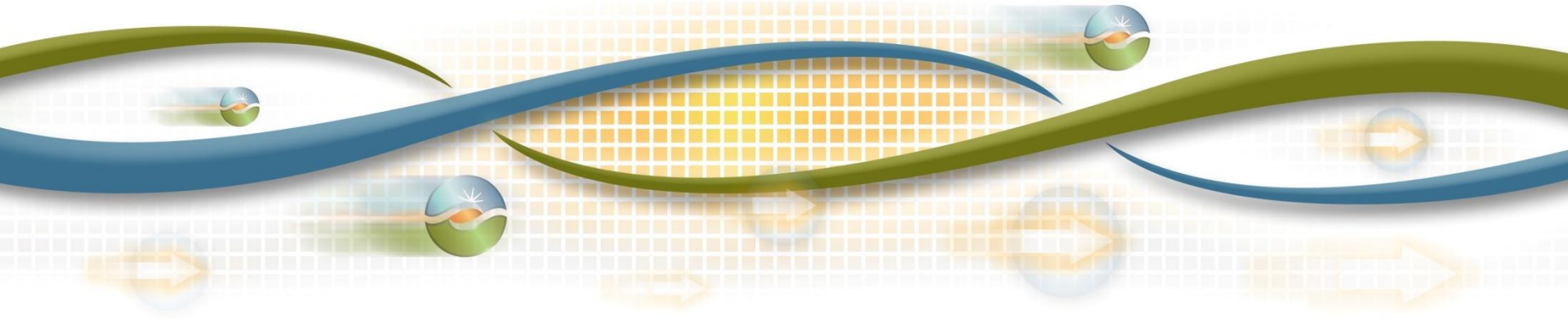
| SCP Target | 90 (87.5-92.5) |
|---|---|
| SFCP Target | 85 (82.5-87.5) |

| Resource | SCP Availability | SFCP Availability | SCP charge or credit | SFCP charge or credit | Net Availability Credit or Charge |
|---|---|---|---|---|---|
| Resource 1 | 93 | 90 | Credit | Credit | SCP Credit + SFCP Credit |
| Resource 2 | 85 | 90 | Charge | Credit | SFCP Credit - SCP Charge |
| Resource 3 | 95 | 80 | Credit | Charge | SCP Credit - SFCP Charge |
| Resource 4 | 85 | 80 | Charge | Charge | -SCP Charge - SFCP Charge |

California ISO
Shaping a Renewed Future

# Proposed Flexible Capacity Backstop Procurement Authority

Karl Meeusen
Market Design and Regulatory Policy Lead



# 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

# The adder method will apply to backstop capacity

- SFCP and flexible capacity backstop procurement should be priced using a similar mechanism
- Any flexible capacity backstop procurement will use a method similar to the adder method
  - Should provide a greater incentive for LSE's to ensure flexible capacity RA showings have sufficient flexible capacity
  - May reduce the cost of backstop procurement for flexible capacity
    - LSE's can provide uncommitted flexible capacity to meet flexible capacity backstop procurement needs.
- LSE will have 30 days to cure any deficiencies

# Reliability Services Action will ultimately be primary backstop procurement mechanism

- 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

# Next Steps

- Comments on straw proposal
  - Comments Template posted October 10, 2013
  - Due October 16, 2013
  - Submit comments to fcp@caiso.com

- Board of Governors
  - February 2014

# Appendix

# Example of Allocated 3-hour net load ramp: Evening Ramp

| ISO flexible capacity needs assessment | |
|---|---|
| Δ load | 4,500 |
| Δ wind | -2,000 |
| Δ solar PV | -2,500 |
| Δ solar thermal | -1,000 |
| Total flexible capacity need | 10,000 |

| | LRA 1 | LRA 2 | LRA 3 | LRA 4 |
|---|---|---|---|---|
| Percent Monthly average load change | 35% | 30% | 20% | 15% |
| Percent of total wind contracted | 40% | 20% | 25% | 15% |
| Percent of total Solar PV contracted | 30% | 35% | 15% | 20% |
| Percent of total Solar Thermal contracted | 70% | 20% | 0% | 10% |

| LSE | Load contribution | Wind contribution | Solar PV contribution | Solar Thermal contribution | Total contribution |
|---|---|---|---|---|---|
| LRA 1 | .35 x 4,500 = **1,575 MW** | .40 x -2,000 = **-800 MW** | .30 x -2,500 = **-750 MW** | .70 x -1,000 = **-700 MW** | 1,400+800+750+700= **3,825** |
| LRA 2 | .30 x 4,500 = **1,350 MW** | .20 x -2,000 = **-400 MW** | .35 x -2,500 = **-875 MW** | .20 x -1,000 = **-200 MW** | 1,200+400+875+200= **2,825** |
| LRA 3 | .20 x 4,500 = **900 MW** | .25 x -2,000 = **-500 MW** | .15 x -2,500 = **-375 MW** | .00 x -1,000 = **0 MW** | 800+500+375+0= **1,775** |
| LRA 4 | .15 x 4,500 = **675 MW** | .15 x -2,000 = **-300 MW** | .20 x -2,500 = **-500 MW** | .10 x -1,000 = **-100 MW** | 600+300+500+100= **1,575** |
| Total | 4,500 | -2,000 | -2,500 | -1,000 | 10,000 |

# Example of Allocated 3-hour net load ramp: Morning Ramp

| ISO flexible capacity needs assessment | |
|---|---|
| Δ load | 7,500 |
| Δ wind | -2,000 |
| Δ solar PV | 2,500 |
| Δ solar thermal | 1,000 |
| Total flexible capacity need | 6,000 |

| | LRA 1 | LRA 2 | LRA 3 | LRA 4 |
|---|---|---|---|---|
| Peak Load Ratio Share | 35% | 30% | 20% | 15% |
| Percent of total wind contracted | 40% | 20% | 25% | 15% |
| Percent of total Solar PV contracted | 30% | 35% | 15% | 20% |
| Percent of total Solar Thermal contracted | 70% | 20% | 0% | 10% |

| LSE | Load contribution | Wind contribution | Solar PV contribution | Solar Thermal contribution | Total contribution |
|---|---|---|---|---|---|
| LRA 1 | .35 x 7,500 = **2,625 MW** | .40 x -2,000 = **-800 MW** | .30 x 2,500 = **750 MW** | .70 x 1,000 = **700 MW** | 2,625+800-750-700= **1,975** |
| LRA 2 | .30 x 7,500 = **2,250 MW** | .20 x -2,000 = **-400 MW** | .35 x 2,500 = **875 MW** | .20 x 1,000 = **200 MW** | 2,250+400-875-200= **1,575** |
| LRA 3 | .20 x 7,500 = **1500 MW** | .25 x -2,000 = **-500 MW** | .15 x 2,500 = **375 MW** | .00 x 1,000 = **0 MW** | 1,500+500-375-0= **1,625** |
| LRA 4 | .15 x 7,500 = **1,125 MW** | .15 x -2,000 = **-300 MW** | .20 x 2,500 = **500 MW** | .10 x -1,000 = **100 MW** | 1,125+300-500-100= **825** |
| Total | 7,500 | -2,000 | 2,500 | 1,000 | 6,000 |