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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee
the Resource Adequacy Program, Consider
Program Refinements, and Establish
Annual Local Procurement Obligations.

Rulemaking 11-10-023
(Filed October 20, 2011)

**ADMINISTRATIVE LAW JUDGE'S RULING RESETTING SCHEDULE FOR
COMMENTS ON PHASE 2 RESOURCE ADEQUACY ISSUES AND
SCHEDULING A PREHEARING CONFERENCE**

This Ruling sets a new schedule for comments for Resource Adequacy (RA) issues in Phase 2 of this proceeding. A workshop was held on January 23, 2013 to consider issues described in the Phase 2 Scoping Memo. Topics fell into three categories: RA for distributed generation, flexible capacity, and other modifications to the Commission's RA program. A Transcript was made of a summary of the Workshop, and presentations from the Workshop were added to the Transcript per my direction (Transcript at 42). The Transcript and presentations are part of the record of this proceeding. Per an e-mail Ruling on February 7, 2013, comments were due to be filed by March 15, 2013, with reply comments due by March 29, 2013. That schedule is superseded by this Ruling.

At the January 23 Workshop, I informed parties of some general questions I was interested in receiving comment upon (Transcript at 43-45, slightly modified for clarity):

First, does the Commission need to make a decision on the matters this year? We have a Commission decision in resource adequacy which will occur in June of this year, the last Commission meeting in June. Second, does the Commission need to make a decision on either the DG deliverability or flexible capacity procurement issues this year? Is there a need? If there is such a need to make a decision in those proceedings, in those matters, what decision should it be? Should it be a policy decision? Should it be an implementation decision? And, third, then the question will be if you believe that there is a detailed decision that needs to be made either on policy or implementation, what should that be? Regarding flexible capacity, should it be the ISO proposal? Should it be the Energy Division proposal? Should it be something in between? Should it be something completely different?

After the Workshop, Energy Division worked to revise their flexible capacity proposal presented at the Workshop. The revised Energy Division proposal is attached to this Ruling. In order to provide parties an opportunity to consider this revised proposal, Energy Division has scheduled another Workshop to be held on March 20, 2013.

On March 11, 2013, Sierra Club and The Utility Reform Network filed a Motion requesting evidentiary hearings on flexible capacity issues. In order to consider this Motion and other procedural matters, I have scheduled a Prehearing Conference (PHC) on March 20, 2013. The PHC will commence at 9:30 a.m.; the scheduled workshop the same day will begin after the PHC.

Given the revised Energy Division proposal and upcoming Workshop and PHC, I will extend the deadline for comments on Phase 2 issues. Comments may be filed no later than April 5, 2013, with reply comments filed no later than

April 15, 2013. Comments and replies may address all issues in the scope of Phase 2 of this proceeding, and considered in the January 23, 2013 Workshop or in the attached Energy Division revised proposal.

IT IS RULED that:

1. Comments on issues considered in the January 23, 2013 Workshop and/or in the attached Energy Division revised proposal attached to this Ruling may be filed no later than April 5, 2013. Reply comments may be filed no later than April 15, 2013.

2. A Prehearing Conference is scheduled for March 20, 2013 at 9:30 a.m. in Commission Courtroom, State Office Building, 505 Van Ness Avenue, San Francisco, California.

Dated March 11, 2013, at San Francisco, California.

/s/ DAVID M. GAMSON

David M. Gamson
Administrative Law Judge

ATTACHMENT

Energy Division Flexible Capacity Procurement Revised Proposal

R.11-10-023 - Resource Adequacy

[Megha Lakhchaura and Donald Brooks]

[The revised straw proposal provides CPUC staff's vision of how to evolve the Resource Adequacy capacity procurement process to include flexibility characteristics from generation resources.]

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1. Flexible Capacity Procurement Revised Proposal

This proposal focuses on RA program modifications and the compliance framework required for implementing the procurement of flexible capacity.

California's electric grid faces significant operational challenges due to increasing reliance on intermittent renewable resources (33% by 2020) and retirement of a significant proportion of the flexible generation fleet occurring over the same period. The Commission and the California Independent System Operator ("ISO") both agree that securing sufficient operational flexibility is critical due to intermittent resource integration and changing load patterns.

In this phase of the Resource Adequacy ("RA") proceeding, Energy Division Staff ("staff") proposes to direct Load Serving Entities ("LSEs") towards explicit procurement obligations for flexibility needs, and to modify the RA procurement rules to address flexibility issues. Staff also proposes to address the following reliability concerns raised by Parties:

- The increasing penetration of renewable intermittent resources (up to and beyond 33% of generation) that will displace dispatchable generation used to maintain grid reliability;
- The retirement of once-through cooling ("OTC") generation resources over the next 4-7 years;
- The threat of retirement of relatively new generation facilities because they cannot remain economically viable without long term capacity contracts.

Recent studies were conducted by ISO and Energy Division staff to evaluate the effect on load patterns of the increasing hourly generation of solar and wind resources in the future.

Study results show that as the level of intermittent resources increases to meet Renewable Procurement Standard ("RPS") requirements more flexibility in new and existing generating resources is needed to integrate RPS resources.

The following hypothetical is a realistic example of the challenge facing the grid:

- During the morning hours the pattern of decreasing intermittent non-dispatchable wind generation exacerbates the challenges to grid operation posed by increasing load.
- Later in the morning, increasing solar generation ramps and displaces thermal generation through the midday load peaks.
- Conversely, while load is still high in the late afternoon solar energy decreases rapidly necessitating rampable resources to increase generation to meet load at the end of the day.

In the future the combination of changing load characteristics and generation fleet composition will likely increase reliability risk during off-peak times and non-summer months. This evolving

situation necessitates increased access to dispatchable supply and demand resources whenever possible, and planning for more sophisticated ways to procure and manage the resource fleet.

On August 13, 2012 staff led a workshop to discuss viable definitions of resource flexibility, determine measurable attributes or proxies for flexibility, methods for determining flexibility needs, and the capabilities of the generation fleet to fulfill these needs. On October 29, 2012 the ISO and two of the three Investor Owned Utilities (“IOUs”) issued - “Resource Adequacy and Flexible Capacity Procurement Joint Parties’ Proposal” (“Joint Proposal”). The Joint Proposal discusses the conditions arising from unmanageable load and an increase in supply resources that are not responsive to dispatch instructions. The Joint Proposal recommends the Commission establish a flexible procurement obligation on LSEs that would essentially target procurement towards resources that are committed to economically participate in the market and not just self-schedule. The proposal consists of several recommendations believed to be integral to implementing a flexible capacity procurement framework. Staff issued a proposal on February 7, 2013 and after stakeholder feedback received at the January 23 workshop and through informal comments, revised its proposal to the current document. Staff changed the counting convention from “Count-all” to “Differentiated Capacity” option and changed the compliance requirements accordingly.

On December 6, 2012, the Commission released a scoping ruling in the RA proceeding R.11-10-023. The scoping ruling included the Joint Proposal and questions developed by staff on the proposal. To complement the Joint Proposal with necessary tariff changes at the ISO, the ISO issued a straw proposal on December 13, 2012, titled “Flexible Resource Adequacy Criteria and Must-Offer Obligation.” This new ISO straw proposal seeks to increase economic dispatchability of RA resources by enforcing submission to economic dispatch as part of a flexible RA Must Offer Obligation (“MOO”) that will change how RA resources participate in the energy market. Energy Division Staff proposes to address the need for procuring flexible generation through an interim mechanism while working toward a long-term solution.

2. Objective of Staff Proposal

As the first step to a more far reaching evolution of the RA program, staff recommends implementing an interim flexible procurement mechanism within the RA program. D.12-06-025 directed parties to define “flexibility” and develop implementation details to require LSEs to procure “flexible” capacity as part of the RA obligations beginning in the 2014 RA procurement process. Other objectives include:

- determining an efficient and effective definition of flexibility that facilitates reliable grid operation;
- defining RA Program features and compliance mechanisms;
- establishing a path that allows for evolution of the RA program and future RA needs; and

- striving to reduce regulatory uncertainty through a simple proposal that does not create inefficiency and waste in procurement contracting.

3. Counting Convention

To count towards a flexibility procurement, a resource can specify how much of its capacity can be submitted towards economic dispatch, net of the resource's rampable range restricted by minimum operating levels. The flexible portion of the resource's operating range is called the flexible range, the minimum operating range and any range not counted as flexible are considered the generic range. Staff considered the following three options for quantifying a resource's flexible and generic ranges.¹

- Pro-rata Option: Pro-rata sharing of flexible and generic capacity;
- Differentiated Capacity Option: Distinguish flexible capacity from generic capacity; and
- Count-all Option: Count all capacity from "dispatchable" generators as flexible.

One of the differences between the Count-all Option and the Differentiated Capacity Option is that the former recognizes the entire resource as "flexible" or "inflexible" while the latter recognizes the megawatt ("MW") as "flexible" or "generic" when it is above the minimum operating level ("PMin") of the resource.

Staff proposes to adopt the Joint Proposal's recommendation for the "Differentiated Capacity Option" to count a resource's flexible capacity.² A major advantage of the Differentiated Capacity approach is the marginal economic incentive that would apply to existing and future resources to optimize a resources capability to operate flexibly. This option can incentivize existing plants to manage their operating characteristics to squeeze out more flexibility, such as decrease their start up times or decrease their PMin. These modifications to operating practice could make these resources more useful to the ISO or more likely to be dispatched given that an LSE were to pay them more for that functionality. This may result in Master File updates or other changes to ISO operations, but the incentive of a more rewarding contract may push a generator to take on the risk of more economically dispatchable operation.

This option requires a resource to keep its generic and flexible capacity separate and flexibility is measured as a MW value called Effective Flexible Capacity ("EFC"). The EFC value is calculated based on operational characteristics of individual generating units and is calculated by the CPUC analysis of ISO Master File data. The CPUC may supplement the adopted Qualifying Capacity manual to incorporate EFC methodology. In the Differentiated Capacity Option, for the designated flexible capacity the generator agrees to be subject to economic dispatch rules.

¹ Joint Parties' Proposal, October 29, 2012 (Section 5.3.2)

² Joint Parties' Proposal, October 29, 2012 (Section 5.3.2.1)

This option demarcates between the flexible and generic components of capacity and leads to lower flexibility needs. While this option may be administratively difficult to implement: the advantages appear to be greater over the long run.

Staff initially favored the count all approach, due to the advantages it offered with respect to the implementation of a flexible capacity procurement framework and for the purpose of RA compliance, but these issues were surmountable; the added accuracy of the flexibility obligation persuaded staff that the differentiated approach had more benefit.

While the Count-all Option is simple, it would result in a considerable increase in flexible procurement needs. On adopting the Count-all Option, the flexible needs would also have to account for the inflexible portion (PMin) of flexible resources in the form of an additional flexible capacity reserve. The other major drawback with not differentiating between the flexible range and the generic range of a resource arises from the different treatment of flexibility by the ISO and the Commission. The ISO would need to modify its market functioning to accept bids for a portion of the resource, up to PMin in order to dispatch the unit into its flexible range. This is different from how resources would commit themselves in entirety for flexible RA via supply plans. There may be a significant operational disconnect if LSEs had to account for flexibility differently at the ISO for the flexible MOO and for RA showings. Considering all these limitations of the Count-all option and with an eye on potential for future procurement rules changes, staff reconsidered the Differentiated Capacity approach.

4. Defining the Flexible Capacity Obligation

D.04-10-035 established an LSE-based procurement obligation. In subsequent RA proceedings, the Commission gradually added new features and created obligations like local RA obligations, Path 26 obligations etc. Joint Parties proposed that an LSE would be required to procure a MW amount equal to a particular month's need for flexible resources as a portion of its overall RA procurement for the month. Staff proposes to calculate an LSE's flexible procurement obligation as follows, which is consistent with how system and local RA obligations are allocated.

$\text{LSE monthly flexible capacity procurement obligation} = \left[\frac{\text{LSE monthly coincident peak load}}{\text{CAISO monthly coincident peak load}} \right] * \text{Aggregate monthly system flexibility requirements}$

Twice in each year, LSEs would receive reallocations of their flexible procurement obligations, on the same timeline as the reallocations of local RA obligations. Staff will adjust the flexible procurement obligations based on load migration twice a year similar to the local RA true up. The local RA reallocation process includes two adjustment cycles, one occurring during the first quarter of the year to apply for filings in the second quarter in the year, and one occurring in the second quarter of the year to apply for filings in the third and fourth quarters of the year.

5. Use of Resource to Satisfy Flexible Capacity Obligation

Flexible resources must not only be capable of operational flexibility, but must also be contractually bound to operate subject to economic dispatch. Thus flexibility has both a technical distinction and a contractual distinction. The ISO distinguishes flexible resources in the NQC list based on the operational distinction. Staff agrees with the Joint Proposal that for resources to be operationally flexible, resources capable of starting up and ramping to PMin, must either sustain the ramping capabilities or output for three hours.³ The “dispatchable tag” identifies the resource as capable of operating flexibly.⁴ For RA counting purposes Staff proposes to use the term “flexibility tag” and recommends that for its purposes the ISO rename the “dispatchable tag” to “flexibility tag” to distinguish between “dispatchable” and “flexible” resources.

In addition to operational characteristics that are quantitatively determined, staff proposes that LSEs satisfy their flexibility obligations through contractual arrangements that require “flexible” resources to operate flexibly. Qualifying “flexible” resources must economically bid into the ISO markets, and be prohibited from self-scheduling “flexibility”. All qualified flexible resources, except flexible hydro,⁵ would be required to submit economic bids into the energy market between 5AM and 10 PM every day to cover the maximum 3 hour ramping requirement. It is believed that system changes will be needed at the ISO to modify the Master File to recognize the difference between flexible and generic capacity and structure default mechanisms to enter economic bids into associated markets for those resources. Beginning 2014, all qualified flexible resources should submit bids in the market between 5 AM and 10 PM for the flexible portion of their capacity. Beginning 2015 compliance year, staff understands that the ISO will have a tariff in place such that a resource procured and listed in the flexible bucket would be subject to new ISO tariff provisions. This tariff should distinguish a flexible resource from a non-flexible resource based on bidding requirements. Additionally, the tariff should extend the same ISO reliability requirement penalties to the flexible requirement.

6. Hydro Resources

Staff’s opinion is that the MOO requirement in the Joint Proposal for flexible capacity is overly restrictive for use-limited resources (e.g. hydro), and rules out the opportunity for many of these valuable resources to participate as flexible capacity resources in the markets. Therefore, staff supports PG&E’s proposal that flexible hydro resources should be required to submit economic bids, within environmental constraints such as mandatory water deliveries and start up restrictions. PG&E proposes that hydroelectric resources should be required to have 6 hours of energy per day per MW of flexibility. On a monthly basis the flexible resource must be expected

³ Joint Parties’ Proposal, October 29, 2012 (section 5.3.3)

⁴ Joint Parties’ Proposal, October 29, 2012 (Section 5.2)

⁵ Reference -Attachment A

to have at least 6 hours of equivalent energy available daily throughout the month, and consistent with the Joint Proposal, would be required to provide 17 hours of bids each day subject to the 6 hour energy limit.

The Joint proposal and PG&E, in their respective proposals, differ over counting flexibility within a hydro resource. The Joint Proposal recommends the effective flexible capacity of a hydro resource be calculated monthly. According to the proposal, the ISO establishes a baseline output for hydro resources using the average hydro output over the previous five years. The ISO would use energy bids and available capacity from the reference period (i.e.5 years) to establish a PMin equivalent for each hydro resource. The upper end of a hydro resources flexible range would be the higher of the resource's 95th percent of the actual output or NQC.

PG&E proposed that the amount of flexible capacity available from a hydro resource should be based on prospective availability assessments of flexible capacity from the hydro resource owner/operator, as supported by annual and monthly availability plans provided to the ISO, not based on historical bids using an average reference.

Staff had further discussions with the three utilities and the ISO. Staff supports the approach elaborated in Attachment A as provided by PG&E. The key elements of the proposed counting convention for hydro resources are-

1. A hydro resource will qualify as flexible if it has the physical storage capability to provide energy equivalent to PMax for in 6 hours.
2. The proposed EFC should not exceed the NQC or the PMax of the resource.
3. Further, for the month-ahead showing, the resource owner is allowed to adjust the flexibility showing downward to account for hydrological conditions, water duty, and the state of the reservoir. This results in the further requirement that the LSE makes up any short fall in hydro flexibility from other resources.

7. Other Use-Limited resources

Staff does not have a recommendation for other use-limited resources at this time, while recognizing that there are different ways a resource can be use-limited. For example, hydro resources have limits on available energy, while peakers may have limited starts. Staff supports further discussion through workshops and comments to explore this rule in the 2014 annual RA proceeding and through Phase II of the "Flexible Resource Adequacy and Must-Offer Obligation" initiative at the ISO. There is time to develop rules regarding how use-limited resources can be more economically dispatched while abiding by their use limitations. It is believed that sufficient flexible resources without use limitations should provide plenty of head room for LSEs to meet their flexible obligations.

In the future years more discussion is required regarding whether a limit should be imposed on the amount of use-limited resources that should qualify under these criteria. If a limit or cap is implemented, what criteria should be used to determine the limit, and should that criteria depend

on temporal conditions in the market (e.g. day, month, proportion to other flexible resources, and/or amount of non-flexible resources or DR). As the need for flexible resources increases, the adoption of adequate rules for recognizing the available use limited flexible capacity should be well developed.

8. Implementation and Contracting

Because the LSE flexible capacity procurement obligations represents a type of system RA obligation the LSE would be responsible for negotiating flexible capacity provisions within their capacity contracts with generators.

For showing and for procurement purposes, the flexible capacity a resource offers must remain “bundled” with the generic capacity for the specific megawatt. Staff agrees with the Joint Proposal that allowing unbundling of flexible capability of that megawatt of capacity and generic capacity for each megawatt leads to numerous implementation complexities that will likely require complicated and time consuming resource capacity tracking solutions as well as increase potential for market manipulation and exercise of market power.

In order to implement this option, staff proposes the following rules.

1. A generator may chose not to sell the flexible portion and instead sell the resource’s entire capacity as generic capacity. However, should a generator decide to sell any flexible capacity from its resource then it must bundle each flexible MW sold with an equivalent MW of generic capacity.
2. Flexible RA capacity can be used to satisfy system and local RA requirements, given it meets all the established qualifications for system and local RA requirements.
3. Staff will continue to evaluate penalty and enforcement issues associated with flexible capacity procurement during this proceeding. No enforcement options are proposed at this time.

9. Tabulation of Qualifying Resources for Filings

The Joint Proposal envisioned the creation of two lists, one that lists the MW quantity of flexible capacity a resource was able to provide, and a list that would provide the NQC of each resource.⁶ Staff proposes that an EFC column be added to the annual NQC list.

10. Validation Process

Staff proposes that the validation process be as follows:

⁶ CAISO Straw Proposal, December 13, 2012 –Flexible Resource Adequacy Criteria and Must- Offer Obligation (Section 2)

- By May of each year the ISO issues flexible capacity study together with the Local Capacity Requirements (“LCR”) study, which lists flexible capacity need for each month of the year ahead. Stakeholders vet the studies and submit comments. By June the Commission adopts final study results, which consists of aggregate monthly flexible obligations along with the LCR.
- An LSE’s flexible capacity obligation will be based on its load ratio share. In July of each year, the CPUC will notify the LSEs of its annual system and local RA obligations in preparation for the year-ahead RA showing.
- An LSE will list the flexible resources it is relying upon to satisfy the annual and monthly flexible resource adequacy showing required by the Commission. Staff will verify filings with the system plans filed by the generators at the ISO and issue correction notices and deficiency notices if necessary.

11. Future Steps

The Joint Proposal and this staff proposal is one step in the evolution of the RA program towards meeting changing load and intermittent supply. These proposals incentivize generators with the necessary operational characteristics to submit economic bids rather than self-schedule. Staff believes that the following issues should be explored in the next Phase of the ISO “Flexible Resource Adequacy Criteria and Must-Offer Obligation” initiative and the 2014 RA proceeding:

- Ways to remove barriers in the CAISO market that discourage resources from economically bidding;
 - Participation of qualified storage, demand response, and use-limited resources in the flexible capacity procurement framework; and
 - Incentives for generators to modify their units to have a more rampable range and to target new construction towards more flexible resources.
- (See Tables included in Attachment B)

Attachment A - PG&E proposed process to quantify flexibility within a hydro resource

The key element of PG&E's hydro proposal is the establishment of EFC values based on *physical* storage capabilities. Specifically, the EFC values *now* would be based on the inherent physical storage capability of hydro resources; LSEs would nominate some measure of the EFC in the annual and monthly Flex RA showings at lower values, based on actual water conditions. The Flex RA NQC values would be static; the specific capacity counted in showings by LSEs would be dynamic. Further details are outlined below.

Dispatchable use-limited hydro generation resources will receive EFC values based on their available capacity⁷, specifically subject to the physical capability of having a minimum of 6 hours of as-built net storage capacity (immediate upstream reservoir or hydrologically inter-linked⁸ storage sufficient to support 6 hours at PMax), and subject to standard CAISO RA deliverability criteria.

The Scheduling Coordinator (SC) of the resource will submit proposed EFC values to the CAISO, along with documentation of the storage configuration of the hydro resource (i.e. net reservoir storage capacities, and hydrological inter-dependencies) to demonstrate that the proposed EFC is supported by a minimum of a 6 hours of upstream storage capability; and further, EFC shall not exceed the resource's most recent maximum power plant output (PMax) test that is in CAISO's master file, or the most recent Net Qualifying Capacity (NQC) established by the CAISO. This process closely follows the similar NQC procedures outlined in the CPUC Qualifying Capacity Methodology Manual. This information will be submitted to CAISO in a standard format; the CAISO will check the submitted values for consistency with the physical storage capability, PMax and maximum deliverable capacity. If the proposed EFC value is less than or equal to the PMax and the maximum deliverable capacity, and has the required minimum of 6 hours of net storage capability, it is accepted for the EFC value. If not, the previous EFC value is retained. The SC may coordinate with CAISO to update the PMax test or supply other information as requested by CAISO in order to determine an acceptable change to EFC. The SC

⁷ Consistent with provisions of the JP and subject to the 6 hour and deliverability criteria highlighted above, if start-up times are less than or equal to 90 minutes, $EFC = \min(NQC) \text{ or } (P_{min} + (180\text{min} - SUT) * RR_{avg})$; for start-up times greater than 90 minutes, $EFC = \min(NQC - P_{min}) \text{ or } (180\text{min} * RR_{avg})$. Note: PG&E hydro resources have start-up times less than 90 minutes.

⁸ Hydrologically inter-linked upstream storage (i.e. sufficient to support 6 hours of PMax generation) is physically connected reservoir capacity that is located *further* upstream from the immediate reservoir or forebay, but which is inter-linked and operated necessarily in unison. Inter-linkages include pressurized tunnels, penstocks, rivers, canals, and other conveyances; connectedness is defined for this purpose as having a travel time of 90 minutes or less. Note: Applicable PG&E dispatchable hydro resources have either immediate reservoirs or forebays with a minimum of 6 hours of storage capability, or are connected through instantaneous water-connections (pressurized tunnels) to large upstream storage.

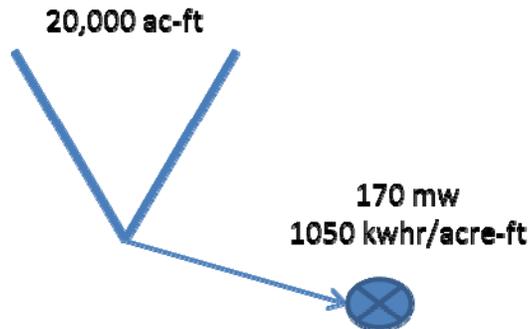
may use this process to update the EFC from time to time. At the time each compliance year's EFC list is published, CAISO will check that each EFC is less than or equal to the most recent PMax for the resource.

Example 1:

Immediate Net Reservoir/Forebay Capacity = 20,000 acre-ft

Resource Pmax = 170 mws

Resource Average Energy Rate = 1050 kwhr/acre-ft



a) Calculations:

$$\begin{aligned} \text{Storage Hours (at Pmax)} &= (\text{Net Storage Capacity}) / (\text{Water Duty} * \text{Pmax}) \\ &= (20,000 \text{ ac-ft}) / [(170 \text{ mws} * 1000\text{kw}/1\text{mw}) / (1050 \text{ kwhr}/\text{ac-ft})] \\ &= 124 \text{ hours} \end{aligned}$$

b) Qualification:

Storage Hours (at Pmax) > 6 hours Yes/No?

Ans: Yes (> 6 hrs), qualifies for EFC⁹

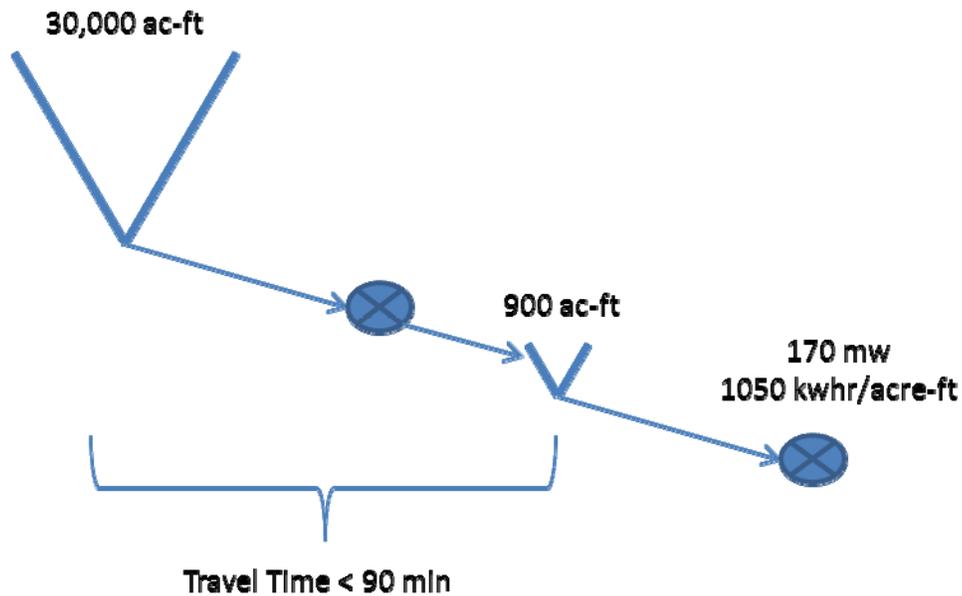
Example 2:

Immediate Net Reservoir/Forebay Capacity = 900 acre-ft

Resource Pmax = 170 mws

Resource Average Energy Rate = 1050 kwhr/acre-ft

⁹ Final EFC values would be subject to other provisions of the JP



a) Calculations:

$$\begin{aligned}
 \text{Storage Hours (at Pmax)} &= (\text{Net Storage Capacity}) / (\text{Water Duty} * \text{Pmax}) \\
 &= (900 \text{ ac-ft}) / [(170 \text{ mws} * 1000\text{kw}/1\text{mw}) / (1050 \text{ kwhr}/\text{ac-ft})] \\
 &= 5.6 \text{ hours}
 \end{aligned}$$

b) Qualification:

Storage Hours (at Pmax) > 6 hours Yes/No?
 Ans: No, further step(s) needed.

c) Return to step a) using *next-in-line* Upstream Net Reservoir/Forebay Capacity and Resource information. Evaluate/qualify. Repeat as necessary moving upstream for all hydrologically inter-linked reservoirs/resources.

The above process would establish the static-EFC values that can be used in the annual and monthly Flex RA showings. LSE would nominate some measure of EFC (values lower than EFC or up to but not to exceed the EFC) in their annual and monthly showings. For clarity, compliance with the CPUC RA and Flex RA showings are treated distinctly from CAISO must-offer obligations. Sufficient NQC and EFC must be included in the annual and monthly RA and Flex RA showings, subject to enforcement by the CPUC. Subsequent to such filings, any EFC that is counted in such showings would then be obligated to the must-offer obligations, subject to enforcement by the CAISO¹⁰.

¹⁰ Counted Flex RA resources with must offer obligations that are not otherwise relieved through approved outages, daily energy limits, or ambient derates, may be subject to replacement requirement or SCP-like penalties.

Attachment B

Currently, any increase in flexibility need would be met by increased procurement of flexible resources when another cost-effective option to meet this need could be to increase rampable space between PMin and PMax. Staff analyzed the fleet data and in the future will explore ways to increase current flexibility of the fleet rather than increase overall procurement. Staff observed that several steam units had a wide flexibility range but extremely long start up times. Peakers had shorter start up times and narrower start up times. There might be merit in establishing a threshold start up time for resources to qualify as flexible or/and establish incentives for lowering PMin and start up times.

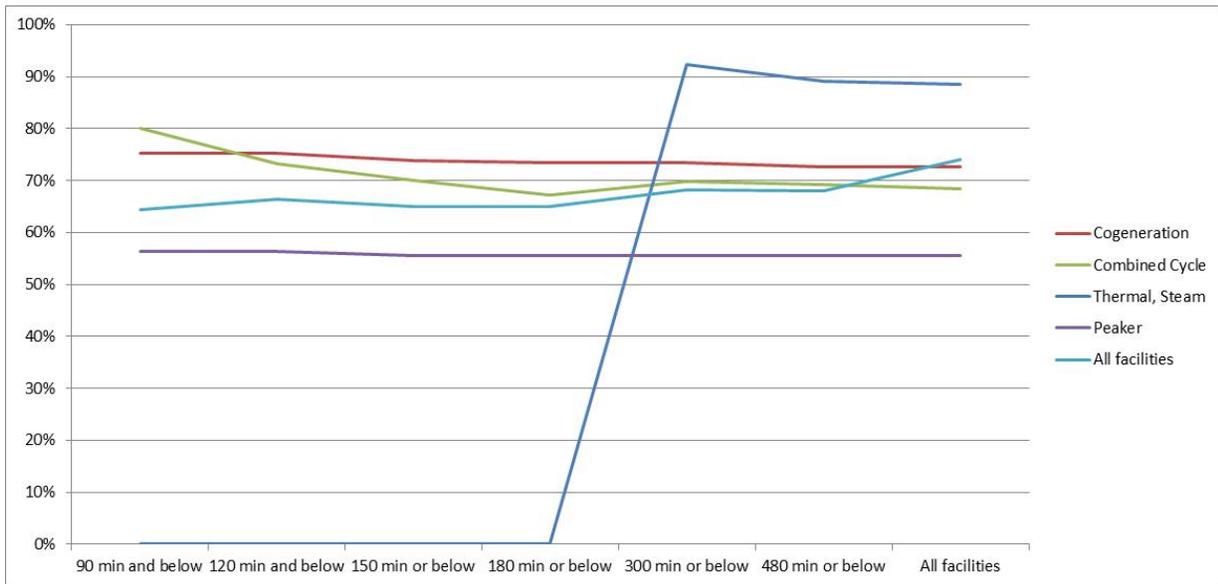
Staff calculated the flexibility range, by 1) resource type (Cogeneration, steam, combined cycle, and peaker plants and 2) start-up time. Staff subtracted the total PMin of all resources that fit into a category (type and start-up time) from the total PMax of those resources in that category. It is apparent that there are significant ranges of start-up times between different resources, although there are also certain patterns in certain types of facilities.

Table 1 - Flexibility Range within Different Resources

Class of unit	Up to 90 min	Up to 120 min	Up to 180 min	Up to 300 min	Up to 480 min	All facilities
Cogeneration	62 units	62 units	65 units	65 units	66 units	66 units
PMin (MW)	768	768	850	850	892	892
PMax (MW)	3101	3101	3211	3211	3261	3261
Flexibility range as percentage of the maximum capability	75%	75%	74%	74%	73%	73%
Combined Cycle	4 units	10 units	24 units	32 units	35 units	37 units
PMin (MW)	68	859	2694	3904	4456	4796
PMax (MW)	340	3203	8213	12901	14464	15206
Flexibility range as percentage of the maximum capability	80%	73%	67%	70%	69%	68%
Thermal, Steam	0 units	0 units	0 units	4 units	8 units	37 units
PMin (MW)	0	0	0	80	158	1423
PMax (MW)	0	0	0	1060	1445	12379
Flexibility range as percentage of the maximum capability	0%	0%	0%	91%	89%	89%
Peaker	90 units total	90 units total	91 units total	91 units total	91 units total	91 units total
PMin (MW)	2096	2096	2213	2213	2213	2213
PMax (MW)	4807	4807	4987	4987	4987	4987
Flexibility as percentage of the maximum capability	56%	56%	56%	56%	56%	56%

Source: CAISO Master File data

Table 2 - Percentage of flexible range by start-up time and by resource type



(END OF ATTACHMENT)