CALIFORNIA ISO
2014-2015 TRANSMISSION PLANNING PROCESS

COMMENTS OF THE STAFF OF THE CALIFORNIA PUBLIC UTILITIES COMMISSION

ON THE 2014-2015 TRANSMISSION PLANNING PROCESS DRAFT UNIFIED ASSUMPTIONS AND STUDY PLAN POSTED FEBRUARY 20, 2014

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March 14, 2014

Introduction

The Staff of the California Public Utilities Commission ("CPUC Staff") appreciates this opportunity to provide comments on the Draft Unified Planning Assumptions and Study Plan ("Draft Study Plan") for the 2014-2015 Transmission Planning Process (TPP).

Our comments cover the following topics:

1. The CAISO should clarify what is meant by having base case assumptions include "transmission upgrades to interconnect new modeled generation", and by having such transmission be included in "sensitivity base cases."

2. Local and system reliability study assumptions should be coordinated with the recent CPUC ruling on 2014 LTPP assumptions, and differences between the basic and preferred resource/storage studies should be clarified.

3. CPUC Staff recommend that the CAISO verify and/or update Appendices A2 (planned generation) and A3 (retirements), with the latest LTPP information.

4. The reliability studies should evaluate and report quantitative implications for deploying phase shifter versus back-to-back DC flow control at or near the Imperial Valley substation.

5. The CAISO should clarify the derivation and use of renewable generation dispatch assumptions described for reliability studies in Section 4.9 of the Draft Study Plan (Tables 4-5 through 4-8).

6. The policy driven 33% RPS analysis should clarify derivation of the dispatch assumptions, and should also report amounts of RA deliverability and annual energy delivery <u>absent</u> deliverability upgrades.

7. Economic studies should provide full rationale and robustness tests for all significant value (not just energy value) attributed to economic projects**.**

8. In the San Francisco peninsula extreme event study, "scenario analysis" and "relative qualitative assessment of risks" should be accompanied by a chain of effect from physical events to electrical and socioeconomic consequences that is sufficiently clear and quantitative to support any major investments for mitigation**.**

9. The CAISO should more fully describe over-generation study assumptions regarding dispatch scenarios, relationship of studied contingencies to typical reliability study contingencies, and operational measures assumed to be available to address the contingencies.

10. CPUC Staff appreciate the announced "concurrent review of planning standards", which should address both allowable load shedding and planning for extreme events in a <u>fundamental</u> manner not restricted to, respectively, N-1-1 contingencies or the San Francisco peninsula.

1. The CAISO Should Clarify What Is Meant by Having Base Case Assumptions Include "Transmission Upgrades to Interconnect New Modeled Generation", and by Having Such Transmission be Included in "Sensitivity Base Cases."

Page 9 of the section of the February 27 Draft Study Plan presentation addressing Reliability Assessment states that in addition to ISO-approved transmission projects, Base Case transmission assumptions will include "*transmission upgrades to interconnect new modeled generation*." Section 7.3 of the Draft Study Plan, "Coordination with Phase II of GIP", states that

> *"…the ISO may need to model some or all of these generation projects [currently in a Phase II cluster study] and their associated transmission upgrades in the TPP base cases for the purpose of evaluating alternative transmission upgrades. However, the base cases will be considered sensitivity base cases in addition to the base cases developed under the Unified Planning Assumptions."*

The CAISO should clarify

1. What interconnection-related transmission upgrades that may need to be included "in TPP base cases" are being referred to above? Are these reliability upgrades identified in GIDAP Phase II studies?

2. Which generation is driving these network upgrades, and is that generation included in the TPP base case resources? For example, is this generation included in particular interconnection cluster studies, or in the CPUC/CEC-provided RPS portfolios?

3. Please explain the definition, composition and use of "sensitivity base cases" containing the generation and associated transmission described above, including how these base cases are differentiated from the main TPP Base Case, particularly with regard to what generation and transmission they contain. In addition - - will the sensitivity base cases be used to authorize transmission projects or only to further inform parties on any need identified in the main TPP base case?

2. Local and System Reliability Study Assumptions Should be Coordinated with the Recent CPUC Ruling on 2014 LTPP Assumptions, and Differences Between the Basic and Preferred Resource/Storage Studies Should Be Clarified.

This topic is of particular interest for the Los Angeles Basin and San Diego areas. It appears, and CPUC Staff agree, that for the basic reliability studies (not those emphasizing preferred resources and storage) the intent is to initially add resources in amounts and types representing the "default" assumptions identified in the Assigned Commissioner's February 27 Ruling initiating the 2014 CPUC Long Term Procurement Plan (LTPP) Proceeding ("ACR").[1] For the basic reliability studies, this would include 2012 LTPP Track 1 and 4 procurement authorization levels for conventional generation. It is unclear and should be clarified whether the TPP studies would start with the minimum or maximum authorized conventional resource procurement levels, e.g., for the West Los Angeles Basin and for San Diego. Customer PV, customer CHP and non-event-based (non-dispatchable) DR should be set at default LTPP levels ("embedded" in the CEC's 2013 IEPR load forecast). Beyond that we understand, and

[1] Assigned Commissioner's Ruling on Assumptions, Scenarios and Renewable Energy Portfolio Standard (RPS) Portfolios for Use in 2014 Long Term Procurement Plan (LTPP) and 2014-2015 California Independent System Operator (CAISO) Transmission Planning Process (TPP).

recommend that as the starting point for the basic (not preferred resources/storage) reliability studies

1. there would be no incremental exporting CHP;

2. wholesale PV (and other wholesale RPS resources) would be at levels and locations specified in the latest 33% RPS "trajectory" portfolio;

3. dispatchable DR would conservatively remain at the levels specified in Draft Study Plan Table 4-11 (equivalent to February ACR, Table 3) - - when converted from a 1-in-2 to a 1-in-10 load basis where appropriate for a particular study, and when scaled from service territory to local levels, also when appropriate; and

4. assumed storage additions would have the amounts and operational attributes (including capacity value) specified in ACR Table 2 (the Draft Study Plan Table 4-12 should be updated to match the ACR Table 2). This is based on the procurement mandate established in CPUC Decision (D.)13-10-040, which further allocates procurement by service territory. Storage should be modeled at the most effective grid locations. CPUC Staff may provide suggested refinements to the characterization of assumed procured storage in Table 4-12.

CPUC Staff request verification that, similar to 2013-2014 TPP studies, any further "need" beyond initially modeled resources will, in the basic reliability studies, be modeled as conventional gas resources.

For the special study of preferred resources and storage (contributing to local area resource needs), which CPUC Staff very much appreciate, the CPUC staff assume and request verification that the initially assumed preferred resources and storage levels will be consistent with assumptions for the "expanded preferred resources" scenario as specified in the ACR for the 2014 LTPP. This includes higher ("High-Mid") additional achievable energy efficiency, high incremental customer PV, high incremental customer CHP, high incremental exporting CHP, the same initial levels of storage and dispatchable DR as in the basic reliability studies, and wholesale PV at levels and locations given by the "High DG 40% 2024 HighMid AAEE + Higher DSM" RPS portfolio.

We request confirmation that in the preferred resources/storage reliability studies the level of conventional resources would be at the minimum authorized Track 1 + Track 4 levels, and that any further "need" identified beyond initially modeled conventional, preferred and storage resources will then modeled as additional preferred and/or storage resources, at the most effective locations - - with the mix of resource types to be determined, and probably with several mixes tested.

CPUC Staff request clarification if preferred resources studies will be conducted for other areas besides the LA Basin and San Diego. We look forward to future discussion and determination of assumed preferred resource mixes, locations and operational characteristics, as well as how variable and limited energy (PV, DR, storage) resources will be modeled.

3. CPUC Staff Recommend That the CAISO Verify and/or Update Appendices A2 (Planned Generation) and A3 (Retirements) With the Latest LTPP Information.

In particular, Oakley and Carlsbad should not be included as known generation additions, as they are not included in the adopted 2014 LTPP assumptions (ACR referred to above). Also, the two listed solar thermal plants likely need to be netted out with (precluded from double counting) amounts of solar thermal MW in the 33% RPS portfolios. The latest LTPP-assumed retirements, as described in the ACR, should be checked against Appendix 3. Also, the description "Study year in which addition is to be first modeled" does not clearly identify online years, and online years should be consistent with the ACR.

4. The Reliability Studies Should Evaluate and Report Quantitative Implications for Deploying Phase Shifter Versus Back-to-Back DC Flow Control at or Near the Imperial Valley Substation.

The draft 2013-2014 Transmission Plan identifies the value of flow control equipment at or near the Imperial Valley (IV) substation to control loop flows to San Diego via the CFE system, to mitigate impacts of outages on the 500 kV lines from IV into San Diego. Back-to-back DC control is described as being more effective but also more costly, and the apparent intent is to have a solicitation for proposals for flow control deployment illuminate the relative costs and benefits of the two kinds of options.

CPUC Staff requests that the CAISO's 2014-2015 TPP reliability studies examine and illuminate the differences in operational and reliability implications for the two different technologies, or else explain why this is not possible.

5. The CAISO Should Clarify the Derivation and Use of Renewable Generation Dispatch Assumptions Described for Reliability Studies in Section 4.9 of the Draft Study Plan (Tables 4-5 Through 4-8).

The Draft Study Plan refers to quantitative and qualitative assessment of hourly GridView renewable output [presumably input hourly wind/solar profiles] for stressed conditions during hours and seasons of interest, and also to cataloguing of the data by renewable technology and location. To clarify and inform stakeholders regarding the important linkage between load and renewable generation profiles in production simulation on the one hand, and reliability study (PSLF) assumptions on the other, the CAISO should provide tables showing, for each load condition and LSE territory depicted in Draft Study Plan Tables 4-5 through 4-8 (e.g., Summer Off-peak for PG&E), the following:

1. what hours are included in that load category (e.g. June-September 2 PM-8 PM, etc),
2. the average output level (fraction of nameplate) for each technology (e.g., wind) for those hours, and
3. the overall range (or other meaningful range such as 5th to 95th percentile) of the output level for each technology (e.g., wind) for those hours.

This would give stakeholders a better understanding and appreciation of how the modeling of wind and solar generation is being handled for reliability study purposes. It would also provide a better bridge (common understanding and linkage) between the transmission planning studies and the operational flexibility studies (including over-generation issues) that are being pursued separately but which we assume (and request CAISO's confirmation of this) are based on the same underlying database of wind and solar generation variability.

The CAISO should clarify if the renewable generation output levels shown in Tables 4-5 through 4-8 are used for both bulk system and local area reliability studies, and also for the 33% RPS portfolio reliability studies. In particular, are there are any differences between the 33%

RPS portfolio reliability studies and the bulk system and local area reliability studies, regarding assumed generation (especially wind/solar) and/or loads?

Continuing from the three listed information items requested above, CPUC Staff have more specific questions regarding wind and solar output assumptions for reliability studies as presented in Tables 4-5 through 4-8, as follows.

4. The CAISO should explain, for Tables 4-5 through 4-8, what "stressed case" refers to. What levels of wind and solar output are assumed, and what are stressed cases used for (e.g., deliverability studies)?

5. Table 4-5 lists a PG&E summer partial peak scenario regarding renewable output levels, yet Table 4-1 (Summary of Study Scenarios in the ISO Reliability Assessment) does not identify summer partial peak but does identify summer light load. Please explain.

6. Similarly, Tables 4-5 through 4-8 identify summer minimum load scenarios while Table 4-1 does not. Please explain.

7. Tables 4-5 through 4-8 indicate that modeled solar output for different conditions (e.g., summer peak) is as follows:

    - summer off-peak - - ranges from 76% of NQC for SDG&E up to full NQC for PG&E,

    - summer peak - - ranges from 25% of NQC for PG&E up to 55% of NQC for SDG&E,

    - assumed solar output is zero for other reliability study scenarios (summer min load and, for PG&E only, winter peak and summer partial peak).

    The CAISO should clarify what drives the above differences in assumed solar output level among the service territories (such as using different hours of the day to represent summer peak in different areas), and why additional scenarios were examined for PG&E only.

Also, it appears that for solar (but not wind) generation the Pmax output level is being defined as NQC, and yet solar NQC is substantially less than maximum output. As previously noted in CPUC Staff comments on the CAISO's technical paper discussing deliverability assessment methodology, it may be clearer for reporting purposes to use some term other than Pmax in this context.

6. The Policy Driven 33% RPS Analysis Should Clarify Derivation of the Dispatch Assumptions, and Should Also Report Amounts of RA Deliverability and Annual Energy Delivery Absent Deliverability Upgrades.

The assumed dispatch scenario is a major driver of reliability and deliverability study results for the policy-driven 33% RPS studies and can be complex and nontransparent for variable wind and solar generation. The CAISO should

1. explain, analogous to Tables 4-5 through 4-8, what dispatch assumptions were used for the policy driven 33% RPS deliverability studies;

2. report not only what additional transmission would be needed (if any) to make the 33% RPS portfolios fully RA deliverable, but also what amount of RA deliverability (by resource area) would be available without such deliverability upgrades; and

3. report the annual 8760-hour energy (not RA capacity) delivery for the 33% RPS portfolios with and without deliverability upgrades.

The above information is especially important when considering that the 33% RPS policy is based on energy not capacity delivery, and when also considering that at some point it may not be desirable that transmission be planned to make all RPS resources fully deliverable for RA purposes.

7. Economic Studies Should Provide Full Rationale and Robustness Tests for All Significant Value (Not Just Energy Value) Attributed to Economic Projects.

For the 2013-2014 Draft Transmission Plan, capacity value made a substantial contribution to the overall calculated value for one project likely to be approved on an economic basis and for another project still under consideration for approval. In fact, substantial capacity value was necessary to drive these projects' benefit/cost ratios above 1.0. Yet, as CPUC Staff and others commented, the rational for how capacity value was computed was not fully convincing or complete, and there was litttle sensitivity (robustness) analysis of the impact of uncertainties on computed capacity value. Thus, for the 2014-2015 TPP, the CAISO should provide a more complete rationale and sensitivity analysis for capacity or any other non-energy (not locational energy price-based) value attributed to projects studied for economic benefits.

8. In the San Francisco Peninsula Extreme Event Study, "Scenario Analysis" and "Relative Qualitative Assessment of Risks" Should be Accompanied by a Chain of Effect from Physical Events to Electrical and Socioeconomic Consequences that is Sufficiently Clear and Quantitative to Support any Proposed Major Investments for Mitigation.

The Draft Study Plan (Section 6.1) and the February 27 presentation indicate that the CAISO intends to conduct a scenario analysis of events and system performance, examining selected mitigation measures. The February 27 presentation also states that it is "*not practical to do a conventional probabilistic assessment or cost benefit analysis to develop detailed and precise quantitative analysis due to the nature or cause of extreme events, potential extent of damage and restoration times, and the potential interdependencies of events and consequences*." The presentation then states that the CAISO is "*considering looking at the relative likelihood of different scenarios and the potential effects of such events to determine a relative qualitative assessment of the risks*"

CPUC Staff appreciate the challenges posed by analyzing and planning for extreme events impacting the electric system, especially when those events have a substantial likelihood of impacting multiple, not necessarily contiguous system components. However, to support informed and objective consideration of risks and mitigation measures, and to test the sensitivity of assessment to uncertainties, alternative assumptions and new information, it is essential to construct and discuss a clear chain of effect from physical events to estimated electrical consequences (contingencies) to estimated socioeconomic consequences including dollars of damages - - with and without key mitigation alternatives. Without such a full, explicit causal framework, indicating probabilities but recognizing uncertainties (via ranges or otherwise), we have insufficient basis for rational discussion or conclusion regarding what risk-reducing investments are warranted, including the implications of "what we don't know". It is difficult to see how a purely "relative qualitative assessment of the risks" is sufficient to inform large investment decisions if not grounded in some absolute (if imprecise) information regarding probabilities and damages. Such probabilities and damages should include the possibilities of credible events causing multiple consequences, some of which may impact the viability or benefits of mitigation measures themselves.

9. The CAISO Should More Fully Describe Over-Generation Study Assumptions Regarding Dispatch Scenarios, Relationship of Studied Contingencies to Typical Reliability Study Contingencies, and Operational Measures Assumed to be Available to Address the Contingencies.

In conducting and reporting on over-generation studies, the CAISO should provide a clear and comprehensive explanation of the dispatch scenarios used to represent system over-generation, including clear explanation of how the scenarios are based on or related to hourly dispatch results from economic (production simulation) studies.

Additionally, the CAISO should explain how the contingencies applied to the over-generation scenario(s) arise from and compare to those contingencies considered in reliability studies. There should also be description of what specific system operational or other measures are assumed to be available and used to mitigate the impact of the contingencies.

10. CPUC Staff Appreciate the Announced "Concurrent Review of Planning Standards", Which Should Address Both Allowable Load Shedding and Planning for Extreme Events in a <u>Fundamental</u> Manner Not Restricted to, Respectively, N-1-1 Contingencies or the San Francisco Peninsula.

The CAISO's stated intent to open a process on "Concurrent Review of Planning Standards" is both timely and welcome. Resource and transmission planning issues, including dramatic changes, have brought sharper focus on questions of what is required and what is desirable, to maintain sufficient electric reliability. Two important areas of concern are:

- Under what conditions (and to what extent) is controlled load shedding acceptable?
- What depth and breadth of analysis, and what characterization of risk, are required to justify major investments to protect against extreme but unlikely events?

The CAISO's announced "Concurrent Review of Planning Standards" should address the load shedding question in a fundamental manner constructively informing stakeholders and infrastructure planning. Regarding controlled load shedding, this review should include but not be limited to "historical consideration" and N-1-1 contingencies. Similarly, the Planning Standards review should consider the appropriate fundamental criteria and framework for assessing risks from extreme events and for justifying investments to reduce such risk. This would certainly be focused on and informed by the specific situation in the San Francisco Peninsula. However, it is important to consider and discuss an overall framework and criteria for assessing this and potentially other extreme event situations.

Contacts:

Keith White, kwh@cpuc.ca.gov