California Transmission Planning Group (CTPG)
Technical Study Team
Response to the August 3, 2011 Comments of the
CEC Staff
on CTPG's Phase 2 Study Plan

Comment:

The scenarios that the CTPG proposed to assess in Phase 2 of the 2011 CTPG effort were reviewed in a stakeholder conference call on July 26. Despite the focus on distributed generation from the Governor's Office – the July 25-26 conference at UCLA happening simultaneous with the CTPG conference call – no CTPG scenario reflects the high penetration of DG espoused by the Governor. The CTPG maintains that it is too late to add any scenarios for its 2011 effort, but a modest modification to the CTPG's analysis plan might shed light on the many issues about a high DG (principally PV) future.

Scenario 7 is composed of a high amount of central solar resource development. It includes 3,468 MW of solar thermal and 8,386 MW of solar PV (nameplate values) located principally in the Central Valley. The CTPG proposes to assess this scenario during a time of system peak (expected to be July weekday at 4PM) induced by 1:10 loads in Northern California and 1:2 peak loads in Southern California. As proposed by the CTPG, the assessment would identify needed upgrades resulting from changes in foundational path flows in which Path 15 flows south to north, and Path 26 flows north to south.

CEC staff proposes that the same scenario characteristics be examined using another common transmission planning stereotype – winter peaks. Winter peaks in most of California are in December in HE 1900. Virtually all solar resources, whether large or small PV, or central solar thermal with some storage extending the power generation profile beyond sunlight hours will have minimal power generation in December in HE1900. Thus, examining Scenario 7 at two system conditions – summer peak as proposed by the CTPG and winter peak as proposed here – will reveal how this resource mix performs at two different stressed conditions and perhaps identify underlying issues with high solar penetration rates that have not yet been examined in a systematic manner. A true DG scenario with the 12,000 MW of PV resources located close to load centers might have yet different path flows, but developing such a scenario may take longer than the CTPG's schedule allows in 2011.

Several underlying issues might be highlighted by testing Scenario 7 under two different sets of conditions:

a. What dispatchable fossil resources are required at these two different sets of system conditions that are certain to occur in each year?
b. If there are discrepancies between fossil resources needed at summer peak and those needed at winter peak, can imports play a useful role in bridging the seasonal gap?
c. Is generation likely to be available for import, but constrained by either major import paths or internal paths from satisfying loads under various contingencies?
d. Would preservation of existing capacity at OTC sites assist in solving the seasonal gap?

e. What further analysis is needed to examine a comparable scale of solar development, but implemented as DG closer to loads rather than central solar deployment?

CTPG Technical Study Team Response:

The CEC staff alludes to the "high penetration of DG espoused by the Governor" and references "a true DG scenario with…12,000 MW of PV resources located close to load centers." Acknowledging the difficulty of adding an entirely new scenario at this point in the CTPG's study process, the CEC staff proposes to add an off-peak sensitivity case to CTPG's Central California summer on-peak (July weekday at 4:00 pm PST) foundation scenario ("Scenario 7"). The CEC staff proposes that this off-peak sensitivity simulate system conditions at 7:00 pm in December.[1]

The CTPG's Central California scenario includes the following amounts of installed distributed solar PV capacity: 500 MW in the PG&E distribution service area, 500 MW in the SCE distribution service area, 52 MW in the SDG&E distribution service area and 25 MW in the LADWP distribution service area. This amount (1,077 MW in total) is far lower than the "12,000 MW" of distributed solar PV referenced by the CEC staff.

The CTPG's Central California scenario includes 9,075 MW of installed central station solar PV and 2,690 MW of installed central station solar thermal. This capacity is scattered throughout California, southern Nevada and western Arizona. Including the 1,077 MW of solar PV located at the distribution level, there is a total of 12,842 MW (9,075 MW + 2,690 MW + 1,077 MW) of installed solar generating capacity. The CTPG Technical Study Team notes that, while this 12,842 MW of solar generating capacity approximates the "12,000 MW" number referenced in the CEC staff's comments, it bears limited resemblance to a scenario in which "PV resources [are] located close to load centers."

As the CEC staff points out, an off-peak sensitivity using the CTPG's Central California scenario would bear a likeness to a scenario representing "12,000 MW of PV resources located close to load centers." This is because both the sensitivity and a 12,000 MW distributed solar PV scenario would reflect little or no solar generation during evening hours in December.

The CEC staff suggests that the off-peak sensitivity would provide useful information regarding the pattern of fossil-fired generation required to meet peak winter loads, the amount of imports used to meet California's peak winter loads, whether such imports would be limited in order that credible contingencies would not result in reliability criteria violations, whether retaining existing generators that use ocean water for cooling (Once Through Cooling (OTC) units) would be effective in meeting peak winter loads, and provide an indication of whether additional analysis would be needed to gauge the impact of PV generation modeled at the distribution level.

While the CEC staff's proposed sensitivity could provide useful information in terms of reliability criteria violations that could arise during winter peak load periods when solar

[1] The CEC staff does not indicate whether this "7:00 pm" hour is Pacific Standard Time or Daylight Savings Time and does not indicate whether this would be on a weekday or a weekend.

generation is at or near zero, the CTPG Technical Study Team does not believe the sensitivity would be useful in addressing the specific matters listed in the CEC staff's comments. Power flow analysis requires that the WECC fossil-fired generation dispatch and associated imports into California be pre-determined. The power flow analysis itself does not indicate which WECC fossil-fired generation dispatch pattern would be preferred for any particular system condition and load level, and therefore provides little information as to what the preferred level of imports into California might be.

The CEC staff suggests that the sensitivity could be used to determine whether imports into California during winter peak load conditions (when there is no solar generation) would be limited in order that credible contingencies not result in reliability criteria violations. Again, because imports into California are determined by the WECC fossil-fired generation dispatch pattern--which must be determined prior to undertaking the power flow analysis—the power flow analysis itself is of limited value in establishing the preferred level of imports into California, whether or not such imports would be limited by credible contingencies. The CTPG Technical Study Team notes that hourly economic grid simulation modeling is better suited to addressing the economic level of imports into California for given set of assumptions concerning the variable operating costs and operational characteristics of generators, hourly load levels and network constraints across all hours of a year. These grid simulation models can be set up to take specific contingencies such that resulting power flows do not exceed thermal facility ratings. Since these models employ DC, rather than AC, solution algorithms, they cannot model voltage or frequency constraints. The CTPG has determined that its 2011 study work will not include hourly economic grid simulation modeling.

The CEC staff suggests that the sensitivity case would shed light on whether retaining existing OTC units would be useful in meeting peak winter loads. The CTPG Technical Study Team believes the question of meeting peak winter loads (when there is no solar generation) is better addressed as part of a more comprehensive assessment of OTC unit disposition. The CTPG has determined that its 2011 study work will not include such a comprehensive assessment. Instead, the CTPG has decided to adopt the OTC retirement/repowering/replacement plans submitted by the respective OTC unit owners to the California State Water Resources Control Board.

The CEC staff suggests that the sensitivity analysis would help to determine whether "further analysis" is needed to examine a "DG scenario with the 12,000 MW of PV resources located close to load centers." The CTPG Technical Study Team believes "further analysis" of the Governor's 12,000 MW distributed generation goal is appropriate. The CTPG Technical Study Team believes that a productive transmission assessment of this goal requires that policy makers work out the relevant details of the goal. Stakeholders will no doubt have a range of opinions as to how this goal should be implemented. The CTPG will consider including this scenario in its 2012 study plan.[2]

Finally, the CTPG Technical Study Team observes that while a winter peak load sensitivity on the Central California scenario might be a little easier to perform than an entirely new "DG

[2] Additional discussion of the Governor's 12,000 MW distributed generation goal is provided in the CTPG Technical Study Team's response to the August 5, 2011, comments of the Bay Area Municipal Transmission group (BAMx) on CTPG's Phase 2 study plan.

scenario with the 12,000 MW of PV resources located close to load centers," it would nevertheless entail considerable effort. The WECC system conditions applicable to a case in which California loads are at their winter peak levels, are significantly different than when California loads are at their summer peak levels. The pattern and level of loads across the WECC are much different, as are California and Pacific Northwest hydro conditions. WECC fossil-fired generation dispatch levels and patterns are also different.