

At this early stage of the stakeholder process SDG&E's comments will concentrate on the over generation (OG) issue and propose a concerted effort to better reflect RT OG prices in the IFM.

### **Over Generation has little or no reliability implications.**

SDG&E's evaluation of over generation (OG) concludes **no load should ever have to be cut because of OG**. Therefore, OG is not a true reliability concern. The CAISO already has all the tools it needs to assure OG never forces load shedding. It may be possible to construct a hypothetical scenario where OG could force load shedding. But the probability of such an event should be lower than other contingency events for which the CAISO is allowed to shed load.

**The CAISO's existing tools can prevent OG from impacting reliability.** OG is a relatively new concern that started when state renewable portfolio standard (RPS) goals realized enough renewable generation, which is 'must take' energy per regulation, such that the balance of generation plus imports vs. load plus exports (Area Control Error (ACE)) could theoretically force exports for an unacceptable amount of time. The CAISO as a BAA always had tools to get ACE back in line. However, these tools are not market based and were setup for infrequent use. SDG&E assumes the CAISO could use these tools as often as necessary to prevent OG from ever becoming a reliability problem. It may be awkward and modifications could be needed to streamline the process if it was used routinely. But reliability would be maintained with no new requirements. SDG&E would like the CAISO to explain in more detail how OG is handled now and what problems need to be addressed in the future.

### **Over Generation has unique characteristics from other reliability concerns.**

Significant **OG is predictable**. It gives minutes to hours of warning and will not occur on medium to high load days. Only when net load drops to a certain threshold (perhaps 16,000 MW) does OG start to be a concern. A warm summer day should be well above this level resulting in no OG. On low load days when load is at or above forecast and generation is at or below forecast, negative prices in the DA market will prevent significant OG. It is only on low load days when real load is below forecast and/or actual generation is above forecast that net load in RT can drop enough for significant OG to occur. Even in this last case, minutes to hours of warning are available as old inaccurate forecasts are updated with better more accurate forecasts. So, the CAISO has time to curtail generation before a reliability problem occurs. OG does not result in a fast acting random contingency event that could cause a reliability problem in seconds like a credible N-2 voltage collapse where the CAISO cannot wait to take action.

**A certain amount of OG is tolerable** with SDG&E's definition of OG. Defining OG as any time generation exceeds load is not productive because NERC reliability criteria demands this happens many time every hour. SDG&E uses a working definition of OG as when generation has a negative value in a CAISO market. OG that does not exhaust decremental bids and creates high negative prices is a valid market

solution and not a problem. Negative prices are only an indication of a potential OG problem. Reliability becomes an issue only when downward flexibility has been exhausted regardless of price. SDG&E assumes the CAISO will curtail generation to prevent ACE from exporting continuously for prolonged periods in violation of NERC reliability criteria. Normally the CAISO would have at least 10 minutes to take action.

### **What exactly are the CAISO's concerns with OG?**

SDG&E needs much more detail on the CAISO's exact OG concerns to help form an effective solution. Expand and explain on any of the following as appropriate:

- 1) Possible reliability violation
- 2) Market prices
  - a. Volatility
  - b. Predictability
  - c. Level
- 3) Increased RT operations impacts
- 4) Extensive out of market actions
- 5) Counter to state goals
  - a. Of maximizing output of renewables
  - b. Exporting \$ out of state with negative prices
  - c. Increasing fossil/flexible generation needs
- 6) Harms
  - a. Generators
    - i. Physically
    - ii. Financially
  - b. Other BAAs
  - c. EIM or IFM expansion
- 7) Other

### **What are the major drivers of OG and possible solutions?**

**The Day-ahead market is mainly blind to OG.** DA prices are rarely negative and have never been low enough to have any significant impact in reducing OG in RT. OG would be an insignificant problem if the DA market could properly reflect RT OG. The vast majority of generation price exposure is in the DA market which, at present, almost completely dampens any significant responses to RT negative prices. Fundamental changes to the CAISO DA market are needed to significantly reduce RT OG.

**Low system loads.** Load increases can be incented mainly by the CPUC and other LRAs. They are already starting to address OG with changes in rate design and programs. Time of Use (TOU) rates will become the norm with pricing to incent load growth in typical OG periods. Smart charging of electric vehicles and other programs will help minimize OG.

**High self-scheduled generation.** When self-scheduled generation reaches the level of load plus exports, OG becomes a concern. SDG&E is investigating ways of reducing the amount of self-scheduled generation. Possible changes in RPS contracts and handling gas for generators Pmins could reduce self-scheduling.

**Imports and Exports.** Imports make OG worse and exports help reduce OG. The CAISO is enabling beneficial exports with the FMM, EIM expansion and possible new CAISO participants. Changing RT imports from self-scheduled to bid in would help minimize OG.

**Insufficient decremental generation bids.** As a follow on to the self-scheduling issue, significant OG can result when the CAISO cannot drop enough generation by accepting decremental generation bids because decremental bids are not in the market. Decremental bids are particularly important for solar PV because the CAISO doesn't have to worry about impacting a unit that will be needed for ramping right after the OG. Renegotiating RPS contracts to contain economic curtailment provisions and bidding them into the market will help the OG issue.

**State policy.** The state's RPS goals and counting rules lead to renewable contracts that favored solar PV with must generate provisions and often without curtailment rights. Curtailing renewable generation helps with OG but hurts meeting RPS. Also running CC plants at min load to be ready for ramping needs while curtailing solar PV is counter to state GHG goals. Even least cost best fit selection of solar PV over wind or solar thermal with storage is complicated without known future costs of OG. Further guidance at the state policy level is needed to resolve conflicting goals.

### **Over Generation is not like RA.**

OG is fundamentally different than RA. RA is used to ensure enough physical capacity exists next year (or for 2 years in the case of retirement) because demand response (DR), energy efficiency (EE), storage and generation takes time to implement. Conversely, curtailing the output of an existing resource (generator or import) takes no lead time to assure OG will not create a reliability problem. There is no need for LRAs to show an existing resource can be curtailed. The CAISO already has the right to curtail a resource to avoid a NERC reliability violation. OG should not be addressed in the RA framework. OG is basically an operational concern and not a planning concern.

### **The CAISO should not rule out RT non-market solutions for OG.**

It is premature for the CAISO to state “it is not appropriate to defer large over-generation and reliability challenges to the real-time and non-market based solutions.” As SDG&E discussed above, OG has little or no reliability implications. The CAISO admits “out-of-market dispatches and resource curtailment may remain solutions needed to resolve some over-generation scenarios”. Until alternative OG control methods are fully vetted and compared, the CAISO should not prejudge any possible solution including the existing one. SDG&E would not be surprised if slightly modifying and streamlining the current OG control methods turns out to be the best method eventually identified in the future.

### **We have years to evaluate the need for any change to current OG processes.**

The bulk of compliance for the 2020 33% RPS goals has already occurred. The CAISO can and has modeled a worst case impact on the CAISO system. However, models and studies have not quantified all the many **counteracting forces that will reduce OG over time**. These counteracting forces are huge. It will likely take a couple of years to agree upon the assumptions and quantify their impacts. There are tremendous changes coming in the next few years that could potentially eliminate all OG problems. A few of them are retail rate changes (like mandatory TOU for residential customers), smart electric vehicle charging, battery storage, smart appliances, EIM and new CAISO PTOs. Existing tools can be used until these critical counteracting forces can be fully evaluated with no significant risk of shedding load.

### **A proposal: better reflect RT OG prices into IFM.**

SDG&E supports a concerted effort to better reflect RT OG prices in the IFM. OG could be held to insignificant levels if the IFM properly signaled and priced RT OG risks. SDG&E agrees with the CAISO that the RT market is not very effective in handling significant RT OG. The IFM sets up the vast majority of generation, including imports and exports, **and is the best place to minimize OG**.

OG should be looked at somewhat similarly as the CAISO contingency modeling enhancements (CME) initiative. CME is trying to properly setup (hold back certain resources) the IFM to assure the CAISO in RT will have enough resources available within 30 minutes to respond to contingencies and prevent reliability violations in monitored flows. CME will raise clearing prices in the DA market but reduce exceptional dispatch (ED) costs and better assure reliability in RT. **Like CME, OG can be reflected in the IFM.**

**Major changes to the IFM would have to be made** to change the behavior of market participants to obtain the needed impact on OG. Market participants have to become accustomed to the possibility of very negative DA prices so they reduce their amount of self-schedules (price taking) and layer in significant negative bidding blocks. The current IFM does a poor job in signaling OG risks in DA prices. DA prices have rarely been negative and never low enough to have any significant impact on RT OG. The IFM needs DA prices low enough to reduce generation self-schedules, increase exports and decrease

imports. The current negative \$150 bid floor may be low enough to get the needed response, but going to the previously discussed negative \$300 bid floor may be necessary. By itself a negative bid floor has shown to be ineffective in reducing RT OG.

**A strong negative price signal must be sent to the IFM that OG could occur in RT.** OG is a probabilistic event driven by variations in load, generation, imports and exports. The markets are currently in a bit of a “Catch 22” situation for OG. The positive DA prices allow market participants to self-schedule imports and generation (including variable) and lock in revenue instead of bidding in RT. When RT prices go negative with OG it is only a lost opportunity cost if they don’t reduce imports or generation. So market participants are shielded from the current OG signal (only in RT) and can continue self-scheduling. A strong DA OG negative price signal is needed to break this cycle. It will also take some time for high negative DA prices to change bidding behavior and it may take a significant number cumulative events.

One way to signal the probability of OG in RT to the DA market is to **base DA assumptions on high variable generation and low load.** Like CME this would bias the DA market to avoid RT OG. This will not impact reliability if the adjustment is not made on medium and high load days when OG will not occur. On low load days there will be plenty of generation and imports available if in RT, variable generation is actually low and load is high.

**The exact amount of RT OG risk to reflect in the DA market will take considerable development.**

Reflecting too little OG risk in the DA market will not be effective in setting up RT to successfully minimize OG. Reflecting too much OG risk could be costly and decrease market efficiency. Generally DA prices will be driven down (demand biased down) and RT prices will be driven up (to supply demand removed from DA market). The net impact on market participants will have to be estimated and compared to other OG mitigation measures. The goal is not to eliminate all RT OG. For very low probability convergence of low load and high variable generation (probably exacerbated by high self-scheduled imports and low self-scheduled exports) curtailment of generation will still need to be used.

**Resources needed for ramping needs should not be curtailed.** If a resource is needed for ramping before its minimum down time and startup time would allow, the resource should not be curtailed. Rules would have to be developed on how to equitably spread needed curtailments.

**Constraint relaxation prices may have to be reevaluated.** The interaction of the bid floor and constraint relaxation prices on price formation in the DA market will have to be evaluated to avoid unintended consequences. It is preferred that market bidding behavior handle RT OG without distorting price formation and market efficiency.

### **In summary, SDG&E recommends CAISO:**

- a. Include an adjustment for generation and load uncertainty
- b. Monitor and feedback adjustments
- c. Use only when OG probability or level reach a threshold

- d. Consider bid floor change to (\$300)

**Some intended results:**

- e. Will lower DA price that has been ~\$1/MWH higher than RT for 2014
- f. RT price will increase above “no IFM intervention”
- g. More appropriate because market participants lock in the majority of their price exposure in the DA market and Load can only bid in DA