GRIDLIANCE

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GridLiance West LLC Comments in Response to CAISO's May 20, 2019 Transmission Capability Estimates as an Input to the CPUC Integrated Resource Plan Portfolio Development

June 11, 2019

GridLiance West LLC (GLW) appreciates CAISO's preparation of a white paper and opportunity to weigh in on how the transmission capabilities are developed at CAISO for use in the CPUC's Integrated Resource Planning (IRP) activities.

Summary of GLW Comments

GLW encourages development of more robust practices to determine and impose capability limits. Sometimes, a conservative approach from CAISO benefits ratepayers. However, in this case, is providing to the CPUC capabilities that overly constrain the IRP solution. Specifically, CAISO by limits its analysis to support full deliverability, identifies only large-scale upgrades, and ignores system costs in setting additional energy-only limits. These limits preclude the CPUC from considering in the IRP renewables that are located in development areas that are environmentally beneficial and less expensive to develop. This situation should be remedied.

Instead of basing capabilities and upgrade costs on interconnection studies that look to peak deliverability, the capabilities should consider grid impacts from smaller resource additions and should look at societal costs, not full capital costs for upgrades to support full deliverability. While CAISO may view its capabilities as rough estimates for the CPUC's and CEC's consideration, these capabilities are impacting the IRP outcomes and raising the expected portfolio costs in addition to potentially delaying California meeting its goals.

GLW urges CAISO to:

1. Not apply new capabilities before a portfolio has been studied. In the short run, this means, not remap resources outside of RESOLVE's solution from the 2017 – 2018 CPUC IRP and instead fully study them in this current Transmission Planning Process (TPP), yielding better information about congestion, constraints and costs and benefits of required upgrades;
2. Develop capability and cost parameters for the IRP that have more steps, or gradations, than just a single step, such that initial build outs in the short run are not penalized by presuming very large upgrade costs;
3. Employ an alternative energy-only methodology that recognizes that a small amount of curtailment may still yield a cost-effective siting at some level in a generation pocket;
4. Recognize that upgrades for additional renewable siting have benefits and provide net cost results – not simply full upgrade costs – to the CPUC for its use in RESOLVE; and
5. Provide stakeholder information for any new or revised capability specifying the basis for the new or changed limit, including the presumed solution to remedy the constraint and the method

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employed to develop cost estimates for that constraint. Allow stakeholders to comment on these methods and findings before advising the CPUC or CEC to invoke them.

Comments

GLW comments on various aspects of CAISO's transmission capability estimate process herein.

1. Need for Robust Determination of the Capabilities

The reason CAISO provides capability estimates to the CPUC is that CAISO and CPUC have divided roles in optimizing the resource and grid buildout in California. No single model is employed to perform a full optimization across the TPP and the renewable resource selection. Rather CAISO uses portfolios from the CPUC – portfolios that do not fully consider transmission constraints, and the CPUC uses transmission constraints from the CAISO – constraints that do not fully consider the generating resource trade-offs. GLW believes the goal of CAISO's provision of transmission information to the CPUC is to emulate as best as possible an optimization of both transmission build-out and resource selection. If a single optimization model was used to consider both transmission and resources, the resulting transmission and renewable portfolios would meet the constraints and values embedded in the optimization at least cost.

Given the "hand off" of transmission information from CAISO to the CPUC; however, such discrete "limits" create a risk of deviation from what otherwise would be an optimal grid and resource buildout result.

GLW recognizes through our analysis the importance of these capabilities being set properly. There are two primary reasons why this is the case.

1. Additional constraints imposed by CAISO will cause the IRP solution to consist of renewable resources that are more expensive than the resource mix that would be chosen without the constraints.
2. Further, an IRP resource solution constrained in this way will effectively[1] *never cause CAISO to fully study in its Transmission Planning Process the same constraints it "estimated" and fed into the CPUC analysis.*

For both reasons it is important to both the IRP process and the TPP process that CAISO's "estimates" are very accurate and representative of what would have resulted from a full TPP study.

The goal of the CPUC and CAISO individual studies should be to emulate what would result from a joint optimization as best as possible. GLW believes it is important that CAISO apply the same level of rigor when declaring constraints that it would during a full TPP study, and when that is not feasible, that CAISO should offer its full methodology and findings for stakeholder review as CAISO is beginning to do with the subject white paper.

[1] Renewable costs captured within RESOLVE can be no longer considered with even a CAISO transmission constraint of $50 million.

2. CAISO May Burden Ratepayers with Unnecessary Costs if It Is Overly Conservative

From CAISO's white paper and discussion during the May 28, 2019 stakeholder meeting, it seems there has been a tendency on the part of CAISO to oversize the constraints and solutions. For example, CAISO looks to generation interconnection queue information and suggests that the queues provide useful insights because of the very large quantities of renewables that are in the queue. However, accommodating this high level of renewables results in network constraints arising that may not exist at lower levels of buildout.

Considering high levels of renewable penetration to determine for capability information also results in CAISO identifying large-scale upgrades, upgrades that when priced into RESOLVE or the renewable mapping outcome result in renewables being shifted out of desirable renewable areas and into areas that are, by their nature, less desirable – either environmentally or cost-wise. Further, CAISO is using a methodology that limits energy-only (EO) buildout to a level that would imply zero curtailment in an area, and as discussed further in Section 3 of our comments, this also negatively impacts the IRP solution. Being overly conservative, or supersizing the buildout assumptions of the proposed solutions, has adverse impacts to California in the IRP by biasing away from low-cost, high quality renewables that could otherwise be sited economically.

3. Methodology is Oriented Toward Deliverability; Deliverability is Only One Quality of Renewable Deployment in the Grid

CAISO relies on generation interconnection studies to identify upgrades. However, the bulk of the renewable portfolio new capacity is EO. Thus, the focus on full capacity deliverability status (FCDS) in the analysis creates a mismatch with the majority of renewable capacity being indicated in the CPUC's analysis. GLW urges CAISO, CPUC and stakeholders to consider a methodology that supports EO interconnection beyond FCDS interconnection of resources.

4. The CAISO's Energy Only Methodology Needs Further Refinement to Reflect the Economics of the Grid.

CAISO has proposed to convey EO capabilities in excess of FCDS capabilities only to the extent there is thermal generation or imports to back down in the generation pocket of relevance. As discussed above in Section 1, the goal of CAISO's capabilities should be to satisfy the renewable requirements and other buildout limitations at least cost – subject to grid reliability. CAISO's proposed EO assessment effectively would assign an infinite cost to any curtailment of the renewable resource wishing to interconnect as EO. That is if the capacity of the generation pocket to reduce thermal or imports is zero, no additional MWs of capacity are accommodated unless the resource is less expensive than the next best alternative by at least as much as the major upgrade cost (the *FCDS upgrade cost*) identified by CAISO. Consider the following example.

- In Gen pocket A, the levelized cost of a solar plant is $50/MWh;
- Outside of Gen pocket A, the levelized cost of a solar plant is $55/MWh;
- There is no thermal generation or imports to decrement down to accommodate the energy during peak production;

- An EO 500 MW facility added in Gen pocket A would experience 5% curtailment for local conditions;
- CAISO's identified major upgrade cost on a levelized basis is $200/MWh.

The effective cost of the 500 MW facility in Gen pocket A could be thought of as ($50/MWh)/0.95, or $52.6/MWh. This cost would still be less than procuring renewables outside of the gen pocket at $55/MWh. Yet the cost difference between the resources does not come close to overcoming CAISO's major upgrade cost determined for the FCDS resources. This means that even though Gen pocket A would fail CAISO's test, it would have been lower cost to Californians to site some MWs within the Gen pocket A.

An interesting result of CAISO's approach is that it biases away from smaller amounts of incremental EO by virtue of requiring any EO capacity to bear the full burden of a major upgrade. It also biases against smaller generation pockets on the grid – those that may not encompass significant thermal generation or be adjacent to import and export points. This bias serves no productive value and only harms the resultant IRP solution.

GLW believes that it is important to be more specific in the determination and articulation of the algorithms that yield constraints and their costs. Constraints and capabilities determined as part of the generation interconnection process may only be based on peak case conditions, and they would represent snapshot views catered well to questions of deliverability, but would not be appropriate to question the overall value proposition of siting more renewable capacity inside the zone as compared to siting outside of the zone. GLW expects that it will be necessary that CAISO invoke production cost studies to properly set the capacities and the impact of exceeding the FCDS capacities for purposes of accommodating more EO capacity. GLW encourages robust discussion on alternatives, be it that CAISO runs a production cost model to determine the system cost at various buildout levels and/or the amount of curtailment for different EO buildout levels.

Certainly, it is not appropriate to assume zero MWs of EO should be accommodated beyond the FDCS capacity simply because no thermal generation or imports deliver directly to that area. Even in the short run, GLW recommends that instead CAISO work with the CPUC and stakeholders to otherwise define any EO limitations consistent with the true cost of adding resources on a grid that has constraints, for example, by adding a cost factor (such as a multiplier) at given incremental additional EO levels that reflects the fact that additional curtailment of the resource's energy may be necessary as buildout increases.

5. **Using full capital cost as a "hurdle rate" for new constrained areas will overly constrain the IRP solution and likely lead to sub optimal solution.**

CAISO's estimates of the cost to exceed the capabilities seem to be based on the full cost of upgrading lines. Adding the full cost of transmission system upgrades, without considering any adjunct benefits – even the economic ones – will result in a distorted renewable and grid buildout. Consider an example.

- Gen pocket C and Gen pocket D both are great renewable areas where equally inexpensive, high quality renewables can be built out at prices lower than any other area.

- Gen pocket C requires an upgrade costing $25 million. Gen pocket D requires an upgrade costing $30 million, and at these prices building out either area is cheaper than siting elsewhere. Based on these costs alone CAISO's constraint costs would result in RESOLVE siting Gen pocket C resources first, resulting in a portfolio heavy in Gen pocket C and the need for the $25 million upgrade.
- However, consider the possibility that the upgrade in Gen pocket D resulted in other grid benefits of $15 million, while the gen pocket C upgrade had no impact on grid benefits beyond delivering the renewables. The adjunct benefits of the Gen pocket D upgrade means that it would be the least cost solution (assuming of course all else is equal).

The example shows that using capital cost alone to drive the IRP portfolios provides no confidence that the upgrade results in an optimal renewable and grid buildout. Instead CAISO should ensure that the constraints embedded in RESOLVE represent costs including other production cost benefits for the grid. Akin to how CAISO performs the TPP, it is important to look at both the costs and the benefits of any upgrades being considered. This is another example of why it is beneficial for CAISO to conduct a full TPP round on a portfolio before settling on a constraint. A portfolio that results in congestion creates the ability to define upgrades that resolve the congestion, and an additional simulation run can then determine what additional benefits the upgrades accrue.

While this approach may sound involved and hypothetical, GLW's own analysis found this to be meaningful and not overly time consuming. The analysis presented in GLW's Jan 2019 CPUC IRP Comments on the proposed Preferred System Plan shows that the upgrades necessary to accommodate substantial levels of renewables in GridLiance West's footprint, though costing over $150 million, would produce benefits of significantly *more than* $150 million with the buildout at the levels indicated by the CPUC's portfolios. Thus, if these the transmission projects were evaluated consistently with how they would be under CAISO's economic planning studies, it is expected that the projects would be found to be beneficial, because they produce net savings (benefits – costs). To assess the pros and cons of renewable siting based on the transmission upgrade costs alone and ignoring the benefits of those projects – benefits that may include congestion relief beyond the congestion caused by the renewable build out – will not produce an optimal IRP solution.

Studying the portfolios in the TPP (without first constraining the portfolios based on the FCDS-based capability estimates) then determining the best upgrades would yield upgrade costs net of benefits, and the net benefits could be invoked in the CPUC's RESOLVE model. This would be much more appropriate than using the full upgrade costs and ignoring any other transmission upgrade benefits.

6. More information is needed about how CAISO designs the upgrades that would resolve the constraint

It is unclear how CAISO arrives on its proposed resolution to remedy the constraints. More information is needed for changes in the capability numbers if transparency for stakeholders is valued. Specifically, CAISO should offer (i) what study identified the constraint, including what was being studied, (ii) what method or case was being used, and (iii) what the findings were. CAISO should also provide information

about what remedy was presumed and how the cost was derived. GLW would also expect that constraints would not be as lumpy (e.g., large-scale) as they seem to be. For example, with the constraint affecting GLW's footprint, the definition seems to suggest for siting beyond 700 MWs, any additional MWs – be it 1 MW or 350 MWs would cost $150 million, and the cost to site an additional MW over the 700 MWs + 350 MWs would be infinite. Again, these constraints simply drive up the portfolio cost to ratepayers.

Not only will costs be driven up, but the siting itself could be significantly delayed. For example, assume CAISO identifies a constraint in Gen pocket E, and places a new limitation for Gen pocket E; when the CPUC runs the RESOLVE model again two years later sites those constrained MWs in Gen pocket F. CAISO may then identify a new constraint for Gen pocket F, add costs to that siting and not studying those MWs. Two years later the MWs may show up in Gen pocket G, and so forth. If on the other hand CAISO's evaluation of these constraints yields a more refined constraint representation (e.g., Gen pocket E can take 50 more MWs at $25 million, up to 100 MWs at $30 million, up to 400 MWs at $35 million, etc.) then perhaps more of those low-cost renewables identified by the CPUC in that current cycle's IRP could be accommodated. The constraints should be defined smoothly with smaller MW increments; a more sophisticated treatment is warranted and that can be accomplished without adding additional complexity.

An earlier rendition of the implementation of these capabilities from the CPUC's RPS calculator days indicated that upgrades were priced assuming 500 kV paths were being added at published costs.[2] As the grid gets built out, it becomes increasingly likely that generation pockets will arise for which the remedy to constraints will be not a large 500 kV line, but rather could be one or more limited component upgrades. Necessarily supersizing solutions does a disservice to Californians by creating a strong likelihood that buildout in desirable areas will then be deemed not cost effective as a result of the added cost of the super-sized solution.

GLW requests that for each new capability limitation CAISO defines, that CAISO provide the specific details on the derivation of the quantities and costs.

7. More information is needed about when a constraint becomes an IRP constraint

It is unclear what criteria CAISO uses to recommend a new constraint or not. Surely constraints must arise in many locations across the grid. Yet CAISO only recommend a few new constraints for the CPUC's model. GLW encourages CAISO to articulate for stakeholders their proposed basis for including that constraint in the CPUC's RESOLVE model or not.

8. Portfolios should flow into the TPP and be studied before being limited by "estimated" new constraints not studied through the TPP

As touched upon in GLW comment Section 5, GLW believes it is better for CAISO to err on the side of not including limiting renewable capabilities in an IRP cycle for which a portfolio has not already been studied in a prior TPP cycle. A case in point is the constraint that CAISO has proposed for GLW's footprint in southern

[2] CPUC Presentation "RPS Calculator Release Notes (V6.1)", August 1, 2015. See for example, slide 22, stating that the upgrade cost estimates were based on "Single circuit 500 kV AC line[s] to the nearest substation".

Nevada. It would seem much better to study portfolios that result from the IRP in the TPP, rather than never studying them in the TPP and yet limiting the buildout in the IRP based not on TPP results but on generation interconnection studies. Studying a portfolio in the TPP would yield specific, production cost model-based results about the MWs of the portfolio unable to be accommodated as well as the benefits of relieving a constraint through the proposed upgrades.

If instead CAISO anticipates a constraint without studying it through production cost modeling in the TPP and then imposes the constraint through a new capability limit with the CPUC, there is no ability for CAISO, CPUC, or stakeholders to see in detail the impacts of the portfolio on the grid and the costs and benefits of possible remedies. An approach such as this simply ensures that no policy projects are ever built even if such projects would have resulted in a much better portfolio and transmission solution for Californians.