Opinion on the Integration of Transmission Planning and Generator Interconnection Procedures.

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Summary:

The members of the Market Surveillance Committee of the California ISO have been asked to comment on the CAISO's proposed changes to its generator interconnection procedure (GIP) that are intended to better integrate it with its Transmission Planning Process (TPP). The current policies of the CAISO towards the allocation of generator interconnection costs, particularly the costs required for a generator to be considered "deliverable" for the purpose of California resource adequacy requirements, have contributed to a situation that has the potential to seriously undermine the efficiency of both generation and transmission investment in California. Desirable generation projects are being delayed and confronted with uncertainty about transmission connection costs, while studies proceed for large-scale transmission investments that would hypothetically be necessary to accommodate the output of a quantity of generation that far exceeds California's expected need for new generation.

It is in this context that we strongly support the CAISO's proposal. We view it as a large step in the right direction of correcting incentive problems that have contributed to the current situation. As we elaborate on below, the proposal leaves in place elements of the current design that raise concerns. It also can do little in the near term to correct the current problems with an over-subscribed queue of generation projects currently holding generation interconnection agreements with the CAISO. However, at the very least the proposal is an important first step in an attempt to rationalize and reconcile generation and transmission investment in the CAISO system going forward.

1. Background: Transmission Investment Philosophy

The rationalization and promotion of efficient transmission investment has been one of the most difficult issues for restructured electricity markets. The unbundling of transmission from generation services makes coordinated integrated planning

very difficult, if not impossible. As with other energy industries, market rewards provide a strong incentive for individual suppliers and customers to add infrastructure whose benefits can be privately enjoyed. However, many electricity grid investments provide large external benefits to a broad set of network users. This greatly weakens the effectiveness of market-based incentives for some network improvements.

In most electricity markets there has been a prominent role for ratepayer funded transmission investment. In many markets there are distinctions drawn between "shallow" interconnection costs, which directly benefit only a single, or small set of plants, and "deep" interconnection costs, which may involve more general network upgrades that can provide widespread benefits. Historically in California, almost all of these costs have eventually been the responsibility of transmission customers through a standardized transmission charge.

The question of how independent transmission organizations and system operators can simultaneously coordinate ratepayer funded network investment that accommodates a broad set of market participants, while maintaining a neutral stance in determining market outcomes has been a central challenge in the restructuring era. We can characterize the two general common approaches as "generation leads transmission" and "transmission leads generation."

The California interconnection process has been a *generation leads transmission* process over the last decade. A principal driver for new investment has been generation interconnection requests. One of the appeals of this kind of approach is that it appears to allow an ISO to limit the assumptions it needs to make about future generation plans and intentions and may similarly appear to limit the impact of ISO decisions on the generation market.

However, a *generation leads transmission* process requires a mechanism to provide generators with proper incentives to locate in areas that will not create undue transmission investment costs. One of the big concerns with the California approach is that, in the end, ratepayers will pay for excessive levels of transmission in order to accommodate the location decisions of generators.

In the context of locational marginal pricing (LMP), if generators don't face the actual social cost of their location decision, because the CAISO will build up the network to accommodate their output regardless of where they locate, then generator investment decisions would not respond to or reflect locational price signals. This situation can raise serious incentive issues when transmission costs are shared across a wide-base of transmission customers while energy payments and benefits may be enjoyed by only a small subset of those same customers. As discussed below, this incentive problem has contributed to California's current problem.

With the advent of the Transmission Planning Process (TPP), there has been an attempt to have transmission planning determine the bulk of rate based transmission investments and allow those plans to influence generation location decisions. This approach offers several advantages. A prospective investment plan allows for transmission projects, which require much more lead-time, to reach completion in a time frame that is in tune with the generation it will enable to reach the market. By taking a more holistic planning approach, the TPP process also has a better chance of avoiding inefficient outcomes that may arise from piecemeal sequential investment. To the extent that transmission investment is driven by a global plan, rather than the demands of individual generation projects, the risk of overinvestment can also be greatly reduced.

A *transmission leads generation* paradigm also raises two fundamental issues. First, do the planners have enough information about generation intentions to plan transmission expansions in the "right" places? Second, can planners limit the degree to which they predetermine the "winners," the generation capacity that will be able to economically be built to supply a market?

This perspective leads to a focus on the incentive issues at play. Interconnection requests by generation projects seeking to be classified as “deliverable” are currently outstripping the ability of the existing transmission system to accommodate them, as well as the demand of the load-serving entities for renewable energy.[1] Accommodating the full “deliverability” of all the output of those projects would require very large new transmission investments whose costs would ultimately be borne by transmission customers. [2]

A system that had previously required very little up front financial commitment by generation investors has created a large slate of potential projects looking for access to a transmission system that cannot accommodate them all without large incremental transmission investments. Because of the low cost of entering the queue at this time, too many projects took that step in the hopes of being one of the projects to survive when the process of matching supply of projects to the demand for them worked its way through to its conclusion.

The problem has been that large amounts of grid investment are required to accommodate the very large number of projects currently requesting connection. If the CAISO and the State were to plan and build transmission to accommodate the output of every generator who makes an interconnection request and posts the required collateral, the result would be excessive transmission capacity; a system built to accommodate projects that in the end never get off the ground *as well as*

[1] As we discuss below, deliverability in this context refers to a requirement for eligibility for the sale of capacity under California’s Resource Adequacy requirements system.

[2] The GIP process also identifies reliability network upgrades and costs that would be required for projects to interconnect with the transmission grid without regard to deliverability for resource adequacy purposes.

those projects that eventually come on-line. This raises the overall cost of the system to unacceptable levels.

These costs must be borne initially by project developers, who must carry the financial cost of the investments until successful completion of their projects, at which point ratepayers take on those costs. The problem is less that failed generation projects might leave ratepayers responsible for completely unused lines, but that the incentives at play can promote new transmission that would be unnecessary if generation chose to locate elsewhere.

The dominant problem of the current situation is that building all the transmission identified in the GIP process would require upgrading the network with far *too much* new capacity, leading to a likelihood of substantial over investment in the transmission grid. The other, equally unsatisfactory outcome, is that generation projects with early queue positions who lack customers for their output and hence are not moving forward to construction are able to hold up the allocation of transmission to projects that entered the queue later but could sign power purchase agreements if they were allocated deliverability by the CAISO. In the current market environment it is widely believed that the interconnection queue holds excess generation capacity, much of which lacks a customer and will never be built. At the moment the queue includes projects with priority interconnection access but no customers, and projects with potential customers whose transmission access requires the construction of very expensive transmission upgrades to accommodate *both* their output and that of the other projects in the queue.

2. The CAISO Proposal

The most pressing and critical goal of the current initiative is to correct the current incentive problems and reduce the risk that the allocation of deliverability to non-viable generation projects can either hold up the construction of other generation projects, or trigger inefficient costly transmission investments. The current proposal accomplishes this by migrating most of the decisions about *how much* ratepayer funded transmission to build into the proactive and coordinated transmission planning process (TPP), and away from the reactive generation interconnection process.

With some important exceptions, the TPP will now be the primary forum deciding the amount and location of ratepayer funded major transmission upgrades. New generation projects will then compete to be assigned resource adequacy deliverability supported by this ratepayer funded capacity, have the option of funding transmission upgrades themselves to gain such deliverability, or to move forward as an energy only project that will not qualify to meet California resource adequacy requirements. It is hard to overemphasize the importance of this change, and we strongly support this direction.

There are some important challenges that will emerge once such a direction is taken however. These form the basis of our remaining comments on the proposal. We wish to emphasize, however, that even though these comments identify some potential limitations of the new direction, we still view the new direction as vastly superior to the status quo.

However, before discussing this issue, it is important to consider exactly *what* is being allocated by the GIP. This question bears on two other points we wish to make about the current initiative, concerning remaining incentive issues relating to reliability investments, and the role of the resource adequacy process.

Thematically, transmission upgrades in the California planning process can be grouped into two different categories, *reliability* upgrades and *deliverability* upgrades. Reliability network upgrades (RNU) are focused on any network changes necessary to ensure that the new generator can operate *within the context of the congestion management process* without harming reliability. In other words, making any changes necessary so that the congestion management process can deal with any network issues the project contributes to by dispatching the project's energy output downward, including down to zero output if necessary. As we discuss below, reliability upgrades and their cost allocation were not the initial focus of this process, However, we question why they should be treated so differently than deliverability upgrades, given that cost recovery for RNU can create many of the same incentive issues

The transmission planning process is focused on the concept of generation deliverability for the purpose of meeting California resource adequacy requirements. Area deliverability network upgrades (ADNU) relate to the ability of the network to deliver the full output capacity of generation projects to generic regions of the CAISO. The contrast between an ADNU and an RNU is that the issues addressed by ADNU upgrades could also be addressed by dispatching down generation, but the ADNU upgrades area needed to ensure that the generation can be relied upon from a resource adequacy standpoint. The ADNU upgrades are intended to eliminate the need to curtail the unit's output under high load conditions so that its output can be counted upon to meet California load.

From the perspective of locational marginal pricing (LMP), an RNU would not avoid the need for very low prices at a generator location (due to congestion costs), while an ADNU would allow the price to rise to somewhere around the generic system price on average. This distinction helps to highlight some of the incentive issues. In general, chronically low energy prices are meant to signal less desirable places for generation to locate. A guarantee to eliminate the congestion that lowers those prices, through ratepayer funded transmission, greatly dilutes if not eliminates that price signal.

In addition to reducing expected congestion costs, deliverability upgrades also allow for units to claim resource adequacy (RA) capacity credit. This RA capacity can then

be marketed to load serving entities (LSEs) who are required to purchase adequate amounts of RA under the current RA process. The design and operation of the RA process therefore plays a significant role in driving the value of the allocation of transmission deliverability.

2.1 Process for allocation

The first obvious challenge that emerges is how to allocate the ratepayer-funded transmission capacity amongst the potential applicants for that capacity. This question has consumed much of the stakeholder process on the initiative. The CAISO originally considered four approaches we could put into two broad categories; market-based allocation or administrative allocation.

The former group included concepts such as auctioning of deliverability, but raised difficult issues such as how ownership would be defined and possibly transferred, if an auction purchaser later wanted to transfer the deliverability to another entity. The CAISO proposal has sought to avoid many of the difficult issues raised by market-based allocation by developing an administrative process to rank the "viability" of generation projects and allocate deliverability to the top scoring projects.

At a high level, we have identified two sets of issues that should be kept in mind as the process evolves. The first has to do with the ability of the allocation process to efficiently identify the most desirable generation projects. The second concerns the distribution of the benefits from the allocation.

First, without raising specific problems with the ranking criterion, we have reservations about this general approach. The downside of any administrative ranking is that the true market and regulatory conditions that define "desirable" and "viable" projects, may not ex-post, align well with this (or any) pre-specified list of conditions. Consider the comparison to how ISO's allocate transmission capacity in the short-run. They run congestion markets in which users express a willingness to pay for using the network and allocate according to these frequently changing costs and preferences. Short-run congestion markets (the real-time dispatch) are a fundamental tool used by ISO's to achieve efficient and non-discriminatory access to power markets. The allocation method in this proposal strikes us as the antithesis of that approach. The resulting risk is that less desirable projects may be allocated transmission capacity (RA deliverability) that as a consequence is not available for "better" projects, due to unforeseen shortcomings in the ranking criterion or quirks in the weights applied to different categories.

These risks would be less pronounced if the benefits of an allocation were not bestowed in a "use-it-or-lose-it" fashion. When less efficient users have rights to resources under such a basis, be it water rights or transmission deliverability, it can encourage less efficient usage of scarce resources. The typical economic solution to

such a problem is to makes rights transferable, so that rights holders, unable to make efficient use of their rights, can benefit from selling their rights to other entities that are able to make more efficient use of those rights. The lack of such an option with respect to resource adequacy deliverability is likely contributing to the current state of interconnection oversubscription.

A second issue we wish to comment on is the potential distribution of benefits of the allocation of deliverability. Fundamentally, TPP-based transmission projects are funded by demand that is served by California ISO grid. Ideally the benefits of these investments would also flow proportionately to these same customers. One appeal of an option of allocating deliverability to load-serving entities (LSEs) was that these rights could be applied to the benefit of LSEs customers, who partially (but not perfectly) align with TO customers.

There is some risk that, once a generation project has been assigned deliverability, it will gain advantages over other competing projects that would allow it to command higher prices in any contract with LSEs. However, the current proposal could largely mitigate this risk by making allocation in part contingent upon having a PPA *before* allocations are made. Given that both sides will be aware of the potential value of deliverability allocations at stake, this value could be reflected in the contract price. This process may not work as smoothly as just described, however, and there is still a difference between TO customers and LSE customers. At the least, there should be an attempt to evaluate the market effects of this policy as it is implemented.

2.2 Remaining Incentive Issues and Cost Control

A related and equally important concern about the efficiency of the allocation process is that it also, by design, leaves out some criterion, most notably the cost of the project. This is understandable as the CAISO is trying to assign deliverability to generation projects based upon a notion of their viability – or likelihood of completion – rather than trying to construct a long-term version of a least-cost dispatch. However, once one starts ranking projects in any dimension, it can start the process down a slippery slope.

One area we wish to highlight is the set of transmission investments that will still *not* be limited through the TPP process. These are the *local* deliverability network upgrades (LDNU) of selected projects and the reliability network upgrades (RNU) of all projects. These local upgrades are typically project-specific and not the focus of the TPP, whose objective is to identify transmission to support target quantities of generation in fairly large electrical study areas. These investments still remain vulnerable to the incentive problems that have contributed to the conditions motivating these reforms.

In the context of the selection criterion, we note that these costs are *not* proposed as criterion to evaluate the merits of a project. While there is justification for this, it

can create some disturbing outcomes. Consider two projects that score equally well on the CAISO criterion for assigning deliverability, but one has RNU and LDNU costs that are an order of magnitude more expensive. Under the current proposal, these projects would be viewed as equally desirable candidates for allocation of deliverability. We believe that it would be preferable if the overall GPP-TPP contracting process limited the extent to which ratepayers would be exposed to excessive RNU and LDNU costs.

In the context of non-TPP based investment, we note that there is still a general incentive problem where a small LSE can benefit from low energy costs of a project, but share the transmission costs with all CAISO customers. The CAISO has recognized the potential incentive problems by proposing a cap of $40,000/MW on the amount of RNU costs that would be reimbursed by ratepayers. We support this proposal.

In fact, we recommend that such a cap should be extended to *all* projects. This would be a simple, albeit blunt, way to limit ratepayer exposure to excessive RNU costs. Recall that these costs would be ignored in the selection process that determines allocation of deliverability. While contracts with LSEs would be considered, and those contracts themselves may take such costs into consideration, this is a potentially tenuous safeguard. Individual signatories to the contract could still disproportionally benefit from ratepayer financed RNU costs that are shared by all CAISO users.

It is important to note that this does not foreclose the construction of more costly projects, only that such projects would need to have such demonstrable economic advantages that the parties developing it and purchasing its power would benefit sufficiently that they could finance any additional RNU costs.

2.3 Role of Resource Adequacy

In the previous sections, we noted the contrast between the administrative approach to allocating deliverability and the market-based approach for managing congestion in the CAISO's daily markets. It is important to recognize the role that the current resource adequacy framework is playing in this proposal. If not for the RA framework, deliverability would be a non-issue. Generation projects would connect to the CAISO's TPP based network and the congestion management process would sort-out which plants have access to transmission on an hour to hour basis, with congestion rents directly or indirectly flowing to the customers that pay the embedded costs of the CAISO transmission grid.

We are somewhat concerned that the protocols and formulas within the RA framework could drive investment and contracting decisions in unintended ways. For example, the deliverability framework counts the contributions of individual plants without considering any portfolio benefits. The first plant in a location adds

to reliability to a level up to its qualifying capacity, while a second plant would be considered to add nothing to reliability if it does not obtain deliverability. Consider a solar project and a wind project locating in a similar location. Only one may be able secure deliverability, but the combination of both would very likely provide more reliable supply than either plant on its own.

Thus the rough approximations that translate installed capacity into a measure of how much a plant could contribute to the system in a period of system need are further twisted through the lens of the transmission deliverability. There are already concerns that the current framework will do an increasingly poor job of translating "adequacy" to reliability as the system adds more intermittent supply. If deliverability turns out to be an "all-or-nothing" aspect of procurement, such translation errors could be magnified by the transmission allocation rules proposed here.

These points may say less about resource adequacy than about the procurement process in general. It is not clear how much more valuable an intermittent resource with "deliverability" is to the system than such a resource lacking it. It is similarly not clear how much additional value a deliverable intermittent resource adds to a LSE's portfolio. Clearly deliverable projects have a priority in procurement, but we hope that the procurement process for intermittent resources can also recognize the value in projects that do not carry deliverability. Deliverability should not be a treated as red-line determining the economic viability of a project, particularly a renewable one. It could very well be the case that some combination of energy-only resources with other RA-oriented resources (supply or load) would provide both energy and deliverability at a lower cost than a requirement that every renewable resource also be deliverable. We hope that the procurement process properly weighs these trade-offs.

3. Summary

We support the current proposal, which we believe is an important step to take in introducing a coordinated vision to the interconnection of generation facilities to the CAISO system. Some stakeholders have expressed remorse that the proposal does little about the many projects that have already signed interconnection agreements. Many of those issues are legal ones, upon which we cannot offer detailed opinions. However, we believe that there is a dire need to stop unchecked expansion of an already oversubscribed interconnection queue.

Ironically, the extent of the current problem also reduces our concern over several of the issues described above. Because of the large amount of existing capacity in the queue, if that capacity moves forward to construction, many of the secondary issues we raise here may not be pressing for several years. There may be relatively little transmission capacity left over to allocate to later entrants in the queue if the projects currently in the queue are built. However, it is important that the CAISO enforce the terms of its generation interconnection agreements and require

generation projects that have been initially allocated deliverability to meet the terms and milestones of the interconnection agreements in order to retain that deliverability. Even though there may be some flaws to the allocation process outlined here, it is unlikely to have large-scale efficiency effects in the near-term. This provides time for potential refinement and adjustment of some of these issues.