Opinion on Large Generator Interconnection Rule

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Summary

We have been asked to comment on proposals for cost recovery of transmission upgrades necessitated by the interconnection of new large (units greater than 20 MW) generation facilities. Refunding the costs of transmission upgrades undertaken to interconnect new generation facilities can create perverse incentives for site choices by new generation units that introduce market inefficiencies and increase the delivered price of electricity to final consumers. Assigning the obligation to undertake transmission upgrades to new generation unit owners and refunding the costs of these upgrades should only be a stopgap measure for ensuring sufficient transmission capacity to serve demand reliably. For this reason, we urge the California ISO (CAISO) to use a conservative definition of what constitutes a necessary upgrade for a new generation unit to interconnect. Over the longer term, we recommend that the CAISO move away as quickly as practicable from an approach that uses new generation entry decisions as a primary driver of transmission upgrades.

Transmission upgrades with economic benefits spread over large geographic areas are best handled in the context of a state or regional planning process that is coordinated with the relevant state regulatory bodies, rather than through the decision of a single new facility to interconnect. The CAISO has developed a comprehensive transmission planning evaluation methodology which they are in the process of applying to several proposed transmission upgrades. We strongly urge the CAISO and California Public Utilities Commission (CPUC) to work together as quickly as possible to adopt a common methodology for assessing the economic benefits of transmission upgrades in a wholesale market. By relying primarily on refunds of generation owner-financed expansion to construct its transmission network, California risks constructing a network that is both more expensive and less reliable than is necessary.

Background

In July 2003, FERC issued Order 2003, which establishes procedures and agreements for new generation units greater than 20 MW (large generators) to interconnect and establishes a recommended pricing policy for new interconnections. FERC has given regional ISOs and transmission organizations considerable flexibility to develop regional policies. In response to this ruling, the CAISO has proposed a policy regarding large generation interconnection, whereby generators are provided a five-year

credit for costs incurred for "reliability" and "deliverability" upgrades associated with the connection of a large generator.

The MSC discussed the large generation connection issue at its November 18, 2003, meeting in Folsom. In addition, the MSC held a public conference call soliciting input from stakeholders on December 8, 2003. During that call, several stakeholders expressed concerns about (1) the ambiguity of what constitutes a "deliverability" upgrade and (2) the CAISO's intended long-term move to allocate CRRs to generators who make qualifying transmission upgrades. These concerns are also reflected in the written comments provided to the CAISO. We address these and other issues below.

Types of Transmission Upgrades and How Pay For Them

For the purposes of this opinion, it is useful to make the distinction between four types of transmission upgrades:

(1) Dedicated facilities needed to connect a new generation unit to the shared transmission network,

(2) Upgrades of the shared transmission network that a new entrant would find privately profitable to undertake and pay for because they raise the price of power at the entrant's location,

(3) Upgrades of the shared transmission network where the difference between the private and social benefit of the upgrade is extremely small, and

(4) Upgrades of the shared transmission network where the difference between the social benefit of the upgrade and the private benefit of the upgrade is substantial.

These four categories of transmission upgrades are not mutually exclusive. They are, however, useful for clarifying the perverse incentives that can be created by the refund process.

We do not see a case for refunding the cost of upgrades for facilities only used by the new entrant. Dedicated facilities only used by a single market participant should be paid for by that market participant. In a wholesale market with locational marginal pricing (LMP), refunding the second type of transmission upgrades would amount to paying a new entrant to do something that it would do without a refund. Even though there is little reason to refund the cost of these upgrades, there is a case to be made for awarding congestion revenue rights (CRRs) to the new generation entrant to preserve the benefits it obtains from the upgrade in the face of future entrants and load growth.

The third and fourth types of upgrades are mutually exclusive. The most likely example of the third type is a radial upgrade that primarily affects one market participant, and doesn't preclude other, potentially more beneficial additions later on. Our view is that given the current configuration of the transmission network and the location of existing generation units in California, the majority of the transmission upgrades will fall into the fourth category. Moreover, for these upgrades, the difference between the benefits to all market participants and the benefits to any single market participant are

likely to be large. For this reason, we believe that most transmission upgrades should be dealt with through a coordinated transmission planning process led by the CAISO with the close cooperation of the CPUC and other relevant state agencies, such as the California Energy Commission.

This process should proactively undertake all economically viable upgrades—all of those upgrades determined to have expected benefits in excess of the expected cost. The costs of these upgrades are recovered from the transmission access charge paid by all load in CAISO control area. Under the rare circumstances that the private benefits and social benefits of an upgrade do not differ significantly, the cost of this upgrade should be recovered only from the generator or load that benefits from the upgrade.

This coordinated process between the CAISO and relevant state agencies should not preclude market participants from undertaking and paying for upgrades they find privately profitably. We do not recommend refunding the cost of these upgrades. However, as discussed above, the CAISO should award CRRs to preserve the private benefit the market participant receives from this upgrade against future entrants and load growth.

Incentive Problems that Arise from Transmission Credit Provisions

We are most concerned with the perverse incentive effects resulting from the credit-back policy for large generator interconnection. As proposed, costs incurred for the upgrade of transmission facilities are not borne by generators. Because the costs of these transmission network upgrades are ultimately borne by consumers, the new generation entrants will choose where to locate based only on non-transmission criteria such as access to fuel sources and cooling water. This threatens to skew siting decisions. Under a credit-back policy, all transmission costs but those required to directly connect the generator to the bulk transmission grid will be socialized to all users of the network.

A policy of socializing the costs of transmission upgrades instigated by the connection of a new generation plant creates serious incentive problems. One of the key benefits of LMP, which FERC itself has touted, is the improved incentives for the location of new facilities that produce or consume electricity. Those consumers locating in areas into which it is difficult to transmit electricity would pay higher prices. Those producers locating in areas with a glut of supply would earn lower prices.

A policy of subsidizing transmission upgrades under the rubric of interconnection can severely weaken the locational incentives provided by LMP. A generator locating in an area glutted with generation capacity could finance an upgrade that would allow it to sell power in other regions, and then have these upgrade costs ultimately refunded to it by all users of the network. The inequity of allowing large new production facilities to recover the costs of making their power deliverable to other regions is clear if one considers a symmetric policy for consumers, in which large consumers of electricity would be given the opportunity to recover from other consumers the costs of making their power imports less expensive.

Using a credit-back policy as the primary means for upgrading the regional transmission network can introduce market inefficiencies that unnecessarily increase the total cost of serving California electricity demand. Consider the following two options to serve increment to demand: (1) existing generation at a cost of $40/MWh, and (2) new generation at a cost $38/MWh to generate the power and another $5/MWh to pay for new transmission to deliver the power to the load. From the consumer welfare perspective, the new generation option will cost $43/MWh to serve the load and is therefore more costly than existing generation. However, under a credit-back regime, the investor in new generation capacity only sees the $38/MWh cost. Moreover, its artificially lower cost enables the new capacity to undercut the bid price of the existing generation unit in the energy market. Consequently, under the credit-back scheme, the new entrant would find it privately profitable to enter and build the needed transmission upgrade, even though this will not result in the least-cost solution for serving final demand.

Credibility Problem with CAISO's Cost-Benefit Test

The CAISO has proposed a cost-benefit analysis for grid expansions that are associated with new generation to determine the amount of refunds due to a market participant. This cost-benefit analysis is required before going forward with any grid substantial (a cost greater than $20 million) grid expansion.

While we believe that a forward-looking cost-benefit should be part of the comprehensive methodology for determining transmission upgrades described above, our concerns about the CAISO's proposed cost-benefit test for supplier-initiated upgrades relates to its use in determining the refund amount a market participant is entitled to or whether a proposed upgrade is allowed to move forward. While well intentioned, as we have stated in previous opinions, cost-benefit assessments must adequately account for the substantial uncertainty inherent in the many forecasts and behavioral assumptions that such analyses rely upon. Moreover, if the CAISO denies refunds to a new entrant on some or all of the cost of a proposed grid expansion using the results of such an analysis, we are skeptical that this partial or full denial of a refund would be upheld on appeal to FERC. Similar logic applies to the case where CAISO prohibits a supplier from going forward with a transmission upgrade based on the results of a cost-benefit analysis. We believe that FERC will find it extremely difficult to refuse a refund to a supplier for a transmission upgrade if the CAISO has a policy of refunding transmission upgrades undertaken as part of the new generation interconnection process.

Consequently, we believe that a CAISO policy of allowing refunds for transmission upgrades only up to the amount of the economic benefit effectively amounts to a policy that refunds the total cost of the transmission upgrade. This is another reason why we do not favor a refund policy.

If, as we recommend, generators receive no reimbursement or only CRRs for their interconnections, there is no need for cost-benefit analyses by the CAISO for generator sponsored-upgrades (type 1 and 2 upgrades). The reason is that, in the absence of negative spillover effects for the system as a whole, the total system benefits will be at least as much as the generator's benefits, while the generator will be bearing the cost. Consequently, system net benefits for an improvement will be at least as much as

generator net benefits and can be assumed positive if the generator is willing to pay its cost.

Problems with Defining Deliverability

During the December 8, 2003, public conference call several participants stated that it is very difficult to define the concept of "deliverable" power within the context of a wholesale electricity market. We believe that the most useful notion of "deliverability" is an economic one: a supplier's energy is "deliverable" if the bid associated with this quantity of energy is accepted by the spot market operator.

Outside of the economic context, the notion of deliverability of energy from a specific generation unit is inherently ambiguous because it depends on the configuration of the transmission network, the operating decisions of all other suppliers, and the method used to manage transmission congestion. Specifying "deliverability" as the physical ability of a prospective new entrant to inject into the network a certain fraction of the total energy expected from a proposed new unit under a certain set of demand levels, operating levels for other generation units, and levels of available transmission capacity does not solve this ambiguity because the choice of these conditions is itself arbitrary. Regardless of the "deliverability" standard an ISO might impose on new generation units, if at the time the system is dispatched, this unit's bid to supply energy is accepted by the market operator, its energy deliverable.

Consequently, unless a new entrant receives some additional benefit from upgrading the transmission network to satisfy a pre-specified deliverability standard for the energy it expects to supply from its new generation unit, the new entrant will have little incentive to undertake anything but the minimum amount of upgrades necessary to sell into the wholesale market. This explains the success of the PJM transmission upgrade process whereby new entrants that upgrade the transmission network to satisfy certain deliverability criterion set by the PJM ISO are deemed able to sell their generation capacity in the installed capacity market.

California does not currently have an installed capacity market. Therefore, the financial benefit accruing to a new entrant that satisfies the deliverability standard set by the CAISO is limited in the absence of a credit-back or CRR granting policy. Under the credit-back policy, a new entrant in California would voluntarily undertake the second type of upgrades described above, because these are privately profitable without a refund. However, because a supplier is promised no more than a refund of the cost of the transmission upgrade, we do not believe that new entrants will voluntarily undertake upgrades that are not privately beneficial.

Consequently, an interconnection policy that assigns the obligation to undertake significant system-wide upgrades to new entrants may discourage new entry, unless the refund process compensates new entrants for all of the costs of undertaking these upgrades.

One should not conclude from the above discussion that California must therefore establish an installed capacity market. We only note that the success of a transmission

expansion process that requires new entrants to construct transmission upgrades to satisfy a deliverability standard relies heavily on these new entrants receiving some compensation beyond a refund of their costs for construction of the new transmission facilities. For this reason and the incentive problems previously discussed, we strongly prefer a proactive transmission upgrade process as described below

Absent a formal installed capacity market, the major factor in a supplier's decisions to upgrade the transmission network is the cost to deliver power from where its generation units are located to where its demand is located. This cost is directly reflected in the difference in the LMPs at the two locations. Thus, the act of upgrading the transmission network surrounding a given facility is equivalent to increasing the facility's value (or the market price that can be earned by that facility). However, in a looped transmission network, this upgrade can confer significant benefits to many other market participants.

If it were not for the many institutional and economic complications that cause substantial friction in the process of grid investment (lumpiness, both positive and negative externalities associated with a given transmission upgrades, environmental obstacles in the siting process, and other political concerns), LMPs should provide a strong signal to spur transmission investments in the locations where transmission upgrades create the largest economic benefits. However, these complications are very real, and a system that relies upon market prices alone to spur private investment in the network risks an environment of chronic under-investment. Thus because of substantial difference between the benefits to any single market participant and the market at large associated with virtually all upgrades in a looped transmission network, the intervention of a public planning process is inevitable.

However, this intervention should not be conducted piecemeal-fashion in the context of individual connections. In addition to the serious incentive problems described above, such an approach would likely result in a planning process concerned with the location of individual trees, rather than the whole forest. This would be a balkanized approach that could result in the planning in one step reversing the results of the investments made before it. A more coordinated approach is needed.

The Need for a Pro-Active Transmission Expansion Policy

To avoid haphazard expansion of the transmission network, public agencies must take a proactive role in planning and expanding the grid process. Because no single state agency has jurisdiction over the entire transmission network, this process will require coordinated action across a number of state agencies. The CPUC and California Energy Commission should be the major players in this planning process. However, they are not the only players, because the CPUC does not have authority over the municipal utilities or federal power authorities. As the operator of the state's transmission network, the CAISO may be best positioned to coordinate this process, in cooperation with other transmission operators in the WSCC.

The cost-benefit methodology proposed by the CAISO should form the foundation for this process. Such an analysis would allow California to spend its limited

resources on the grid expansions that would provide the most benefit to all users of the grid. This is particularly important as we move to a world with LMP, because an expanded grid will afford more opportunities for competition between generators.

In the long term, the CAISO envisions awarding CRRs to generators that pay to upgrade the grid in order to connect a new generator. However, this CRR allocation process must balance the goal of protecting loads from congestion charges against the goal of allowing generators that pay for an upgrade to preserve the benefits provided by this upgrade into the future. Awarding CRRs has important advantages compared to the credit-back proposal; in particular, it forces generators to weigh the costs of transmission additions against the benefits of economic access to the markets, providing an incentive to site generation where it is most economic. This incentive is most effective when a transmission improvement is of the third type of additions we defined above, such as radial improvements benefiting a single participant. .

However, in a looped transmission network, most transmission upgrades that are economically beneficial to the system would not meet these conditions and therefore belong to our fourth type. Furthermore, we share the concern, expressed by several stakeholder groups, that the awarding of CRRs to generation could create operational and coordination problems associated with running the grid. In particular, PTOs will be required to maintain a portion of the grid that it neither designed nor potentially owns.

We believe that the vast majority of transmission investment should be the result of a proactive and coordinated expansion of the transmission grid. Generator-sponsored upgrades should, of course, not be prohibited, but neither should they be favored by granting refunds to the new entrant that pays for these upgrades.

It is important to emphasize that a sequential generator-led transmission expansion policy is likely to produce a grid that provides the greatest opportunities for these suppliers to profit by shifting transmission costs to consumers and creating a transmission network that benefits their generation units. Because of the refund policy, consumers must ultimately pay for the cost of this network as well. Therefore, under a credit-back scheme for transmission expansion, consumers could end up paying too much both in terms of the cost of building out the transmission network and in terms of resulting price of wholesale electricity.

We realize that a proactive and coordinated process for grid planning would rely on uncertain economic benefit-cost studies and assumptions about what sort of generation additions are desirable and expected in the future. Although there are large uncertainties, a proactive and coordinated planning process will account for the interactions, lumpiness, uncertain benefits, and external effects of transmission upgrades more efficiently than a piece-meal policy relying primarily on generation-initiated upgrades. However, the potential harm to consumers associated with under-investment in transmission is far greater than the potential harm associated with over-investment. As such, we recognize that even an imperfect transmission planning process that actually improves the network is better than a dysfunctional process that makes no investments at all.

Conclusion

When a retailer chooses to build a store in a particular location, they are not afforded the opportunity to build highways leading to their store and charge this construction to all consumers, including those that never visit their store. While the retailer might be allowed to build an access road to the existing highway, haphazard expansion of the highway system to suit the whims of retailers is clearly economically inefficient. For similar reasons, this is also the case with the expansion of the transmission grid.

Because of the incentive and efficiency problems inherent in the credit-back provision of transmission upgrades associated with new generation, we recommend that the CAISO limit the amount of transmission built under this credit-back provision. Although, we prefer to prohibit refunds for all generation-funded upgrades, we recognize that this policy is impractical if the CPUC and other relevant state agencies do not adopt a proactive transmission expansion planning process. For this reason, we recommend as a backstop that new entrants be provided with a credit for reasonably well-defined "reliability" upgrades. Particularly under a wholesale market with LMP, the CAISO should not refund "deliverability" upgrades, because providing a credit-back for these upgrades exacerbates the incentive problems with the siting of new generation as we describe in this opinion, and this would introduce significant inefficiencies in the wholesale electricity market.

A superior strategy is for the CAISO and state agencies to work together to formulate a comprehensive, proactive transmission expansion policy for California. This policy would look to build a transmission network to facilitate a workably competitive wholesale electricity market in California, where suppliers would pay for the cost of connecting to the transmission network, but virtually all remaining upgrades would be undertaken through a forward-looking statewide transmission expansion policy and paid for through a statewide transmission access charge. The credit-back approach to transmission expansion should only be used as backstop in case the state-level process fails to provide the necessary investment to support a wholesale market in California.

Finally, while we do not what to preclude privately planned and financed transmission investment with no credit-back provision, because of the looped nature of the Western US transmission network, we are skeptical that very many transmission upgrades will be financed and built through this process. Nevertheless, the CAISO's process should not discourage a market participant from financing an upgrade of the grid that it finds privately beneficial and receive CRRs to preserve the benefits of this upgrade into the future.