FINAL

Opinion on "Alternative Treatment of New Transmission for Interconnection of Renewable Generation"

by
Frank A. Wolak, Chairman
James Bushnell, Member
Benjamin F. Hobbs, Member
Market Surveillance Committee of the California ISO

October 6, 2006

1. Background

The California ISO recently issued a white paper proposing a third category of transmission expansions specifically for renewable generation projects.[1] Currently the ISO has two types of transmission expansion projects: (1) network facilities and (2) generation intertie (gen-tie) facilities. Network facilities are part of the looped transmission network and typically benefit more than one generation owner and are therefore paid for by the Participating Transmission Owner (PTO) and recovered through the ISO's Transmission Access Charge (TAC). Gen-tie facilities serve one generation unit owner, are typically less than 5 miles long, and power flows over them in one direction. For these reasons gen-tie facilties only benefit the generation unit owner interconnecting to the ISO control area so they are paid for by that entity. The ISO's white paper proposes to establish a new category of transmission facilities to interconnect renewable generation resources. However, a portion of the annual costs of this new category of transmission facilities will initially be paid for by the TAC. Renewable generation unit owners will take over paying a share of the annual cost of these interconnection facilities when they begin operating. The ISO argues that this proposal is designed to address a "market failure that imposes barriers to efficient development of renewable generation facilities." Removing any barriers to the development of renewable generation in California is essential to achieving the state's ambitious renewables portfolio standard (RPS) of 20% percent of retail sales in California produced by renewable sources by 2010.

2. Market Failures Addressed by New Category of Transmission Expansions

There are three features of renewable generation technologies that, in the absence of regulatory intervention, could create a market failure that would increase the cost to California of meeting its RPS goals. First, electricity from renewable generation sources must be produced where the wind, solar or geothermal resource is located, which is typically far from the major California load centers. Second, the total amount of potential renewable resources at a given location can significantly exceed the typical scale of a single renewable generation project. Third, many renewable generation projects are not competitive with fossil fuel generation at current spot and futures prices of natural gas in the absence of explicit penalties to fossil fuel suppliers for emitting greenhouse gases. Unless a California retailer needs renewable energy to meet its RPS requirement, the renewable resource is unlikely to be developed because there are lower cost and more flexible fossil-fuel alternatives available.

[1] "Proposal for Alternative Treatment of New Transmission for the Interconnection of Renewable Generation," California ISO White Paper, September 21, 2006.

These three features can combine to create a market failure that increases the cost to California of meeting its RPS goals. The first factor implies that the interconnection facilities for renewable generation sources tend to be much longer than interconnection facilities for fossil fuel generation sources. The size of the typical renewable resource project is also significantly smaller than the competing fossil fuel generation project. For example, the largest wind farm in the United States is the Stateline Wind Project on the Oregon-Washington border with an installed capacity of 300 MW. Although the Altamont Pass, Tehachapi Pass and San Gorgonio Pass regions in California have more installed capacity, they are actually composed of a large number of individual wind farms. Wind generation projects are significantly smaller than the usual combined-cycle gas turbine (CCGT) generation project, which is typically composed of three turbines with a combined capacity larger than 500 MW. With a few exceptions, most notably the 354 MW Mojave Desert Solar Electric Generating System (SEGS), solar projects are also significantly smaller than CCGT projects.

The significantly larger installed capacity of a CCGT project and the drastically shorter interconnection distances for these projects imply that the cost of the transmission interconnection facilities for the typical wind or solar project is a much larger fraction of the cost of constructing the generation facility. In addition, because there are likely to be many individual renewable generation projects at a single remote location, the size of the interconnection facility needed to serve all of these projects is substantially larger than the interconnection facility needed to serve any single renewable resource project at that location. For example, a location may have the potential to support 1000 MW of wind resources, but the average size of the wind projects at this location may be 100 MW. Because of economies to scale in constructing transmission interconnection facilities, it may be much cheaper from a discounted present value of costs perspective to construct interconnection facilities with the capacity to serve the 1000 MW wind generation potential that exists at this location rather than build only the capacity needed to serve the initial 100 MW project and then add more interconnection capacity as more wind generation capacity enters at this location.

This logic implies the potential existence of a market failure that is common to many forms of infrastructure that benefit a large number of individuals or firms, such as bridges and highways. Even though the total benefits received by all the users of a facility exceeds the total cost of constructing and operating the facility, if the cost of coordinating the many potential users of the facility and extracting sufficient payments from them to pay for the facility are sufficiently high, no private party will find it profitable to construct the facility. Provision by a centralized public entity that has the legal right to extract payments from each beneficiary can drastically lower coordination costs.

Under the ISO's current interconnection policy, a market failure could occur if the total cost of constructing all of the interconnection facilities necessary to serve each renewable electricity supplier at the remote location when it begins producing is larger than the cost of constructing a single large interconnection facility to serve all of the expected entrants at that location when the first generation facility comes on line. Economies of scale in constructing and operating interconnection facilities make the cost of the large interconnection facility to each renewable supplier smaller than if the necessary interconnection facilities were constructed

sequentially, at the time each renewable supplier began producing. If the costs of coordinating all of the expected renewable resource suppliers at a remote location in order to construct the single large interconnection facility are sufficiently high, then under ISO's current interconnection policy the renewable resources owners may instead choose to construct these interconnection facilities sequentially as each new facility begins producing. This sequential construction of the necessary interconnection facilities will result in a total cost for interconnecting all of the eventual renewable suppliers at that location that is larger than the cost of the single interconnection facility built to serve all of these suppliers at the time the first supplier begins producing. However, if the total costs of such a large interconnection facility were charged to the first entrant, it may be so high as to prevent development at all. The ISO can serve as the centralized public entity that eliminates the need for suppliers to incur these coordination costs by allocating the cost of constructing and operating the large least-cost interconnection facility using the mechanism described in the ISO's proposal for a new category for transmission interconnections. Note that this same problem of coordinating transmission investment amongst multiple firms who may benefit from a network enhancement provides much of the justification for the current treatment of 'network' investments.

The third feature of the renewable resource supply noted above further increases the cost of coordination among potential entrants at this remote location. Renewable generation resources are currently only purchased to meet the RPS, because lower cost sources of electricity supply are available to retailers. Consequently, a potential renewable resource entrant can face significantly less demand in the forward market than a fossil fuel supplier, unless a robust forward market for renewable energy certificates (RECs) develops.[2] Specifically, if a retailer has met its RPS standard, then it no longer has any demand for energy from renewable sources at prices that cover the long-run average cost of the renewable generation source, because lower-priced sources of electricity are available. A potential CCGT entrant has an average cost that is lower than many existing natural gas-fired units in California, so that it can compete in the forward market with existing suppliers at prices that cover its long-run average cost. Because renewable generation entrants typically only sign forward market supply arrangements to meet RPS standards, a significant fraction of the potential renewable generation capacity at a remote location may be unlikely to be able to obtain forward market supply arrangements at the time the initial renewable generation entrant at that location is able to sign one.

This logic implies that during the early stages of development of a remote renewable generation location, there could be a number of potential entrants without long-term supply contracts. Under the ISO's existing interconnection policies, coordination among potential renewable entrants is difficult because initial entrants have to ask potential future entrants to share the cost of the single large transmission line to this location despite the fact that they do not yet have a future revenue stream. This is a risk the potential future entrants are very unlikely to be willing to take on. Consequently, under the ISO's current interconnection policies, the initial renewable generation entrant may be forced to construct an interconnection facility tailored only to its interconnection needs rather than to the needs of all eventual suppliers at that location. The

[2] Although California does not have a formal renewable energy credit trading system, the flexibility built into the present system implies that unbundling and credit trading can occur *de facto* ("Renewable Energy Certificates and the California Renewables Portfolio Standard Program," Staff White Paper, California Public Utilities Commission, April 20, 2006, www.cpuc.ca.gov/PUBLISHED/REPORT/55606.htm).

unilateral response of each new entrant at that location to obtaining a long-term supply arrangement can result in a sequence of interconnection facility investments to serve this remote area whose total cost is much greater than the cost of the least-cost interconnection facility needed to serve all of the potential renewable resources at that location.

3. Addressing the Potential Market Failure

The ISO's alternative treatment of new transmission for interconnection of renewable generation is designed to increase the likelihood that the interconnection facilities needed to serve *all* of the eventual supply at a remote renewable resource location is constructed at least cost. This is accomplished by charging the early entrants to the location only a share of total cost of the least-cost line and covering the remainder of the costs of the line through the TAC. Subsequent entrants are charged a share of the remaining cost of the line when they begin producing at that location.

Returning to the above example of 1000 MW of expected wind supply at a remote location that is served by 10 suppliers providing an average of 100 MW of wind generation, the ISO's proposed mechanism would have the initial 100 MW entrant pay 1/10 of the annualized cost of the interconnection project necessary to serve the 1000 MW of capacity. The remainder of the cost of the project would be covered from the TAC. However, as each of the remaining 9 suppliers enters, it would take on its capacity-weighted share of the remaining cost of the interconnection project.

The ISO's mechanism has two attractive features that increase the likelihood that the least-cost interconnection facilities will be constructed. First, it reduces the cost to the initial entrant by only charging them for the portion of the facilities that it uses. Second, it reduces the cost to subsequent entrants by only charging them the capacity weighted share of the remaining cost of facilities at the time they enter.

Although these two features of the ISO's proposal can increase the likelihood that California's RPS will be met through the construction of the least-cost mix of interconnection facilities, there are several aspects of the proposal that must be carefully monitored to ensure this outcome occurs. It is possible for this alternative treatment of interconnection facilities to become a subsidy to remote renewable generation sources that unnecessarily increases the cost of meeting California's RPS goals.

4. Avoiding Unnecessary Subsidies to Renewable Generation Development

The most straightforward way in which the ISO's proposed alternative treatment for interconnection facilities could increase the cost of meeting California's RPS goals is if it leads to over-investment in transmission. This could happen if high-capacity interconnection facilities are built to remote locations in anticipation of significant renewable capacity entry that fails to materialize. This could create a large stranded cost in the form of substantial unused interconnection capacity that must be paid for through a higher TAC. If there are economies to scale in the construction and operation of interconnection capacity to this location, the renewable generation owners that do enter receive a subsidy in the form of a lower interconnection charge

than they would pay if this large capacity facility was not constructed and instead the entrants only constructed the interconnection facility necessary to serve the renewable capacity actually at that location. This subsidy would be funded by all California consumers through the higher TAC resulting from the stranded costs of the unused portion of the larger interconnection facility.

Such a subsidy would have the undesirable effect of artificially depressing the price of RECs by hiding a significant portion of RPS costs within the TAC. This could distort choices among technologies to meet the RPS, by making development of remote sources artificially inexpensive relative to other technologies, such as landfill methane, local wind development, or even renewable imports from other states.

To guard against an outcome that results in large stranded costs and subsidizes remote renewable generation projects, the ISO must ensure that the locations served by these new interconnection facilities are the regions where renewable suppliers are truly likely to enter. The ISO proposal relies on the California Energy Commission's designation of the locations with significant renewable energy potential in determining where to construct these interconnection facilities and how large to make them. The ISO should also work with the California Public Utilities Commission (CPUC) to determine where the forward contracts signed by the major California load-serving entities to fulfill their RPS obligations are actually being sourced. The ISO's transmission planning process should use all reliable information on where renewable resources will locate before making these investment decisions. The potential subsides to renewable generation resources and higher prices to California consumers that could result from constructing too many or too large of interconnection facilities for renewable generation to remote areas in California implies that the ISO must thoroughly vet any interconnection facility that receives this alternative treatment through its stakeholder process and validate through a more formal process that there is sufficient generation commitment in the proposed area to warrant the transmission investment.

A second source of potential subsides in the ISO's proposal arises if new renewable generation facilities are promised firm transmission rights (FTRs) and scheduling priority on these facilities. The ISO currently offers FTRs to entities that interconnect to the ISO control area and upgrade the transmission network. However, parties electing to receive FTRs do not receive scheduling priority on the transmission line. To avoid explicit subsidies to renewable generation owners, the ISO's proposal should award only FTRs without scheduling priority to users of this interconnection facility. Given all of the effort in the Market Redesign and Technology Upgrade (MRTU) process devoted to converting existing transmission rights (ETCs) with scheduling priority into purely financial transmission rights, it would be a significant step backwards for the ISO to create a new set of transmission rights with scheduling priority.

A third source of potential subsidies results from the provision in the ISO's proposal that transfers the remaining cost of the interconnection facility to the TAC if it is designated as a network facility. To avoid subsidizing renewable generation facilities, the ISO should set clear, publicly verifiable standards for how an interconnection facility becomes a network facility. The ISO's stakeholder process should play a major role in setting these standards.

5. TAC or PTO Funding

The CPUC announced in June 2006 that it would allow utilities in its jurisdiction to recover from retail ratepayers the cost of transmission facilities that it deems necessary to meet RPS targets. This mechanism would place the burden of unrecovered facility costs on the ratepayers of these jurisdictional utilities rather than all California market participants that pay the TAC. Given that the RPS is a statewide mandate, requiring only CPUC jurisdictional utilities to fund the project, may inequitably distribute the burden of the interconnection costs of meeting California's RPS mandate. TAC funding would assess any of the costs not paid for the by renewable resource owner on all load in the California ISO control area.

However, if the entire ISO control area is shouldering the risk of unreimbursed project costs via the TAC, it becomes even more important that any interconnection facility funded under this alternative approach be subject to rigorous "open season" provisions to ensure maximum access to all generation developers, not just to those providing renewable energy to the retail customers of the affiliate of the PTO where these facilities interconnect.

6. Treatment of Similarly Situated Fossil Fuel Resources

Although this alternative treatment of interconnection facilities is explicitly designed for renewable generation sources, the ISO should consider this treatment for fossil fuel sources that share the same three features as renewable sources. For example, one could imagine a large coal-fired resource that must be remotely located because of the carbon sequestration potential of its location. If coal sequestration potential of this location is large enough to support a number of coal-fired facilities, the ISO may wish to consider similar treatment for the interconnection facilities to this remote location on the same grounds that no single coal-fired facility would choose to construct the least cost interconnection facilities to this location.