



## Tracking the ins and outs of renewable energy

Bill Powers, P.E. (*published Thursday, October 02, 2008*)

The author of the September 18, 2008 opinion piece titled “Vast renewable energy sources at California’s doorstep” editorial is off-the-mark in citing renewable energy development barriers as the reason that California’s renewable energy production has declined over the past several years. He is similarly off-the-mark in citing limited transmission capacity and permitting obstacles as the reasons that potentially vast Baja California wind and solar resources are not being exported to the California power market. The problem is more basic than the author suggests.

There is no direct way for California’s investor-owned utilities (IOUs) to make money in the development of major renewable energy projects given their lack of eligibility for federal renewable energy investment tax credits and accelerated depreciation.<sup>1</sup> As a result, the IOUs have erected sufficient barriers to entry for renewable energy projects, in the form of non-transparent “least-cost best-fit” selection requirements and unrealistically low renewable energy payments tied to the wholesale price of fossil power, that even the California Energy Commission now advocates scraping the current IOU renewable energy procurement system and substituting it with a simple feed-in tariff structure with fair rates for renewable energy providers.<sup>2</sup>

There is one indirect way that remotely located utility-scale renewable energy projects can increase IOU revenue substantially – by serving as the justification for new transmission lines. The primary mechanism available to an IOU to increase its revenue stream is the construction of new infrastructure in the form of power plants, transmission lines, and meters. Transmission projects are typically the most lucrative projects an IOU can build, with a guaranteed rate of return to the IOU in the range of 11 to 12 percent. The cost of IOU transmission projects are borne collectively by all California IOU ratepayers.<sup>3</sup>

A major complicating factor in the border region when discussing renewable energy is Sempra Energy. Sempra is a major developer of liquefied natural gas (LNG) import infrastructure, natural gas pipelines, and natural gas power plant(s) in Baja California, and also owns San Diego Gas & Electric (SDG&E) and Southern California Gas Company. The major transmission project proposed for the border region is SDG&E’s 1,000 MW Sunrise Powerlink. SDG&E is emphatic that the line will be built to move remote renewable energy in Imperial County to San Diego.

However, the proposed 1,000 MW line will begin at an existing 500 kV substation that receives powerflows from 1,900 MW of combined-cycle capacity owned by Sempra Energy. The direct benefit that Sempra Energy will receive via enhanced market for its combined-cycle plants if the transmission line is built has generated substantial controversy, and called into question whether significant amounts of renewable energy will actually flow over the line.

There is concern in the border region that the rising clamor to access renewable energy resources in Baja California is little more than a cynical bait-and-switch. This concern was accentuated by an August 2008 California Energy Commission report titled “*Current Status, Plans, and Constraints Related to Expansion of Natural Gas-Fired Power Plants, Pipelines and Bulk Electric Transmission in the California/Mexico Border Region.*”<sup>4</sup> The report’s conclusion states, “*At present there is insufficient electric transmission on either side of the border to export as much as 1,000 MW of new electric generation from Baja California that could be fueled by Phase 1 of the (Sempra) LNG expansion,*” and follows by stating that construction of SDG&E’s Sunrise Powerlink would mitigate this constraint.

Illogically, despite the accurate statement in the body of the Sept. 18th opinion piece that the Baja wind resource area is already served by transmission lines on both sides of the border, the author concludes that California must solve its current transmission planning and permitting dilemma to access the Baja renewable energy resource area. The resource area is served by nearly 3,000 MW of transmission capacity. A tremendous amount of Baja wind

energy can be moved to Southern California now with very little upgrading to the existing border transmission network.

There are three faulty framework concepts behind the drumbeat for construction of a new generation of transmission lines to reach remote renewable energy locations in the Southern California desert and Baja California: 1) renewable energy is far more cost-effective in remote desert locations than in coastal load centers, 2) demand for electricity is rapidly increasing, therefore ever increasing amounts of renewable energy will be required to keep pace and meet ambitious renewable energy targets, and 3) existing transmission capacity is limited and fully committed with existing imports (primarily fossil and nuclear power) for the foreseeable future. The first two of these concepts are obsolete. The third was never true to begin with.

The thin-film PV cost revolution is turning conventional thinking about renewable energy economics on its head. This revolution has been fully underway for the last twelve months. Large commercial polycrystalline silicon PV systems installed in Southern California in 2007 had an average installed cost of approximately \$6.50/watt.<sup>5</sup> SCE applied to the CPUC in March 2008 to build a 250 to 500 MW urban PV project at an estimated installed cost of \$3.50/watt based on thin-film PV technology. SCE also indicated in its application that there are several times the 250 to 500 MW of PV described in the CPUC application under the control of the warehouse owners it is working with. SCE paints a picture in its application of a straightforward process to add up to 2,000 MW of urban point-of-use PV to the grid.

SCE is proposing exactly the right project, though with a very inefficient model. Because SCE is not eligible for federal renewable energy tax credits or accelerated depreciation, and a host of imbedded IOU costs, PV power produced by SCE will cost four times what it would cost if provided by a third party commercial PV developer.<sup>6</sup> It may be necessary from a pragmatic standpoint to approve this project, given the IOUs control the electrical distribution system and have been very effective in blocking real progress in renewable energy development. However, for economic reasons alone, the vast majority of large-scale PV installed in the urban core should be built by commercial third party developers under long-term power purchase agreements.

The leading thin-film developer is now bidding and building projects at \$2.75/watt. And this is just the first wave of thin-film PV reaching the market in large quantities. PG&E contracted for 800 MW of thin-film PV projects in coastal San Luis Obispo County in August 2008. Even Sempra Energy now says it will build 300 to 400 MW of thin-film PV at its combined cycle plants in Nevada and Arizona over the next 2-3 years.<sup>7</sup>

As of August 2008, the California Energy Commission identifies the levelized cost of energy for thin-film PV as low as \$114/kWh, while the primary manufacturer of thin-film identifies the expected cost of energy as \$90/kWh.<sup>8</sup> In contrast, the Commission identifies the cost of energy for solar trough technology, the historic basis for the push for many new transmission lines into the desert, at \$140 to \$190/kWh.<sup>9</sup> The presumption that the cheapest solar energy is at remote desert locations is obsolete. Thin-film PV can be deployed just as effectively in the urban core as in the desert.

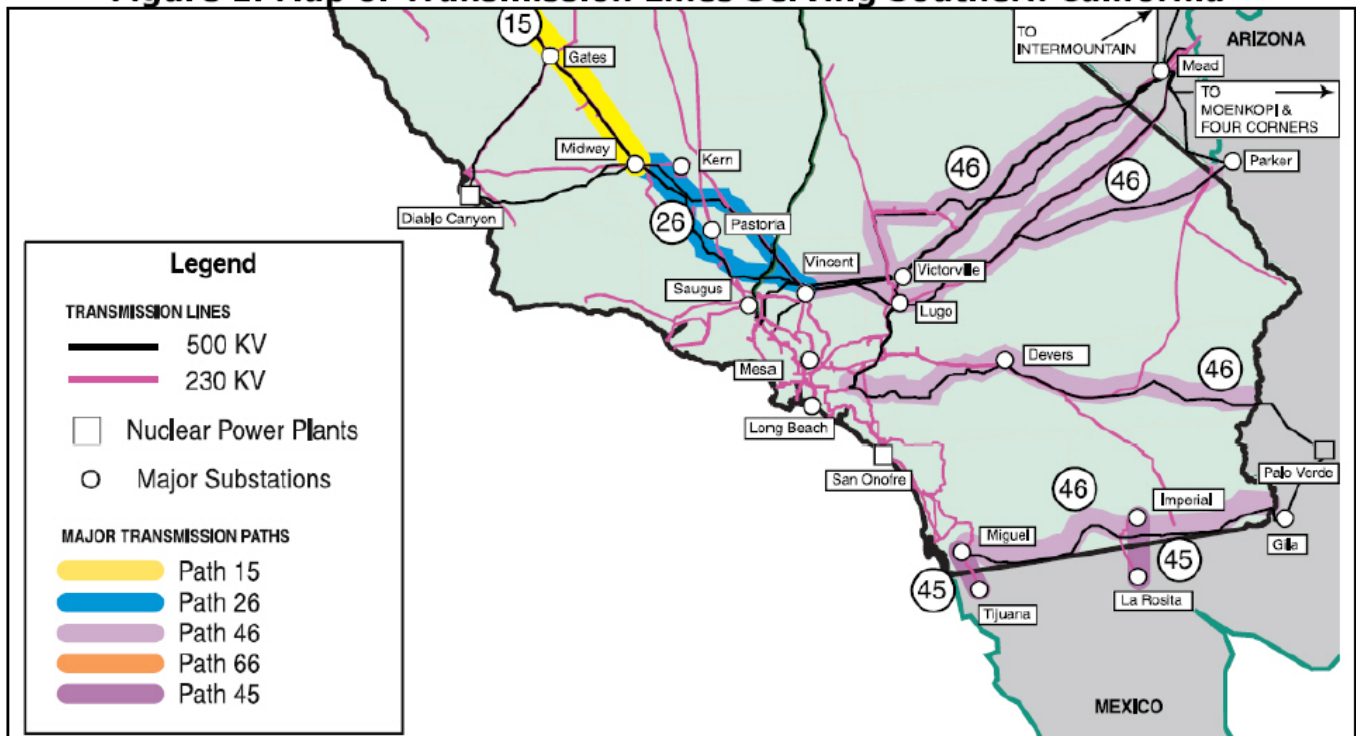
PV produced in the urban core at the point-of-use when it is most needed is much more valuable than remotely generated power. As the California Energy Commission eloquently stated in the 2007 Integrated Energy Policy Report, *"Recent experience with California's electrical system underscores a real need for reliable, zero emission electricity especially at peak usage times within the state's load centers. Solar generation would be paid a higher average price per kilowatt hour because deliveries generally coincide with peak times of delivery. SCE's tariff pays 3.28 times the base MPR (market price referent) for deliveries during the summer peak time of delivery period."* The much higher value of point-of-use PV is the reason that PV developers would seek to locate in the load centers first in a rational market. The development of PV potential at the load center also frees-up space on existing transmission lines by adding generation where it is used.

The California Public Utilities Commission issued a landmark energy efficiency decision on October 18, 2007 that requires the IOUs to achieve 100 percent of cost-effective energy efficiency measures by 2020.<sup>10</sup> The net effect of this decision will be an average absolute decline in annual energy usage between 0.5 and 1 percent per year from 2008 forward, and no growth in peak demand over time.<sup>11</sup> There is no treadmill of ever increasing electricity demand that must be countered by an ever increasing number of desert solar plants and new transmission lines to reach those desert plants.

The presumption that Southern California has insufficient transmission infrastructure is incorrect. No California power emergencies have been caused by lack of transmission. Southern California has 14,000 MW of alternating current import capacity (Paths 26 and 46) and 5,000 MW of direct current import capacity from the Columbia River and Utah, a total of 19,000 MW of import capacity. By way of comparison, the annual average combined retail sales load in SCE, LADWP, and SDG&E service territories is approximately 14,000 MW.<sup>12</sup> Southern California has the

highest concentration of existing transmission lines in the state. Major Southern California transmission lines are shown in Figure 1.

**Figure 1. Map of Transmission Lines Serving Southern California<sup>13</sup>**



The point of California’s renewable energy mandate is to displace fossil power, not simply supplement it. This should be done by displacing fossil imports on existing transmission lines with renewable energy. Given the quantity of existing transmission capacity, a tremendous amount of fossil power displacement can take place on existing transmission lines serving Southern California before there is a compelling need to build new transmission lines to move remote renewable power.

SDG&E is the IOU on the California border with Baja California. As noted, there is already nearly 3,000 MW of existing transmission capacity serving the Baja California wind resource area. SDG&E service territory has an estimated 5,000 MW AC of commercial rooftop and commercial parking lot PV potential.<sup>14</sup> Economics would indicate we exhaust the lower-cost, higher-value PV at the load center before building new transmission to reach less cost-effective remote solar resources. Economics would also indicate that if California chooses to build significant numbers of remote solar thermal plants, these plants should be preferentially located along major existing transmission right-of-ways to make use of existing lines and displace fossil-fuel imports on these lines.

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<sup>1</sup> SCE March 27, 2008 CPUC application A.08-03-015 for urban PV program.  
<sup>2</sup> CEC, 2007 Integrated Energy Policy Report, December 2007, pp. 140-143.  
<sup>3</sup> June 2005 FERC approval of rate schedule for Trans Bay Cable.  
<sup>4</sup> D. Korinek, N. Puga, “Current Status, Plans, and Constraints Related to Expansion of Natural Gas-Fired Power Plants, Pipelines and Bulk Electric Transmission in the California/Mexico Border Region.” California Energy Commission. CEC-600-2008-008, August 2008.  
<sup>5</sup> March 27, 2008 SCE PV program application to the CPUC.  
<sup>6</sup> Independent Energy Producers Association, response letter to March 27, 2008 SCE PV

program application, April 28, 2008. IEPA states SCE PV program cost of energy will be \$0.46/kWh. Thin-film PV developers are now bidding projects at the “market price referent,” which is approximately \$0.10/kWh.

<sup>7</sup> Reuters, “For solar power, Sempra favors thin film,” August 21, 2008.

<sup>8</sup> First Solar comment letter on Renewable Energy Transmission Initiative (RETI) Phase 1A draft report, April 2008.

<sup>9</sup> CEC-sponsored RETI Phase 1B draft report, August 2008.

<sup>10</sup> CPUC decision D.07-10-032, October 18, 2007

<sup>11</sup> B. Powers testimony, CVEUP, Sept. 17, 2008.

<sup>12</sup> B. Powers, Ex Parte Notice, CPUC proceeding A.06-08-010, September 10, 2008.

<sup>13</sup> CEC, Strategic Transmission Investment Plan, Figure 1 – Major Transmission Paths (230 kV and 500 kV), November 2005.

<sup>14</sup> B. Powers, San Diego Smart Energy 2020, October 2007, p. 30-31.