Berkeley Lab and the Clean Energy Group

CASE STUDIES OF STATE SUPPORT FOR RENEWABLE ENERGY

Production Incentive Auctions to Support Large-Scale Renewables Projects in Pennsylvania and California

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CASE SUMMARY

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Case Description

In June 1998, California pioneered the use of production incentives – which encourage project performance by paying on a per-kWh basis – to support large-scale renewable projects. Three production incentive auctions have now been held in the state. For a variety of reasons – most notably a lack of credit-worthy power purchasers, but also including permitting delays and general market uncertainty – more than half of all funded projects (representing more than 80% of total funded capacity) have not yet been built. In late 2000, Pennsylvania tweaked California's production incentive model to suit its own needs in supporting wind power. Though direct comparisons between the two programs are difficult and perhaps even inappropriate given somewhat conflicting program objectives, the design and early results of Pennsylvania's program are encouraging, suggesting that Pennsylvania's approach may be somewhat better suited to bring new wind capacity on line in a short period of time.

This case summarizes California's production incentive program and the difficulties it has faced, and then focuses on how Pennsylvania has attempted to innovate on California's approach to bring new wind capacity on line quickly and prior to the then-expected expiration of the federal production tax credit (PTC) for wind power at the end of 2001.

Innovative Features

- California's market-based program was designed to allow all renewable technologies to compete for funds, and as such has incorporated a relatively high degree of leniency to accommodate the needs of a diverse set of technologies (e.g., long development times for geothermal relative to wind).
- Pennsylvania's program – which focuses solely on wind power and has far lower funding levels – innovates on California's pioneering efforts by providing up-front payment of the production incentive, requiring more stringent bid

bonds from developers, and using greater discretion in selecting projects that combine a low level of required incentive with a high probability of project completion.

Results

- In the three auctions held since June 1998, California has awarded $242 million in 5-year production incentives to 81 projects totaling 1,300 MW of new renewables capacity. So far, 36 projects totaling 203 MW have come on line.
- In late 2000, Pennsylvania awarded $6 million to 2 wind projects totaling 67 MW. One 15 MW project came on line within a year (in October 2001), and the other has been delayed by certain local opposition. Both of the Pennsylvania wind projects have secured 20-year power purchase agreements with Exelon Power Team. In July 2002, Pennsylvania issued a second, less-structured $6 million solicitation for wind power (described in a separate case study comparing competitive solicitations and unsolicited proposals).

CASE STUDY DETAILS

Clean energy fund administrators in the U.S. often face a "chicken and egg" problem when it comes to providing incentives to utility-scale renewable energy projects. On the one hand, these projects typically require not only state financial support but also a long-term power purchase agreement (PPA). Without long-term revenue certainty from *both* sources, renewable developers are often unable to secure suitable financing to develop their projects. On the other hand, state clean energy funds are responsible for only one of the two requirements – state financial support.

Production incentives that pay on a per-kWh basis have become a popular form of state financial support for large-scale renewable energy projects. This is because production incentives encourage maximum energy production and appear not to trigger offsets to the federal production tax credit (PTC) for wind and closed-loop biomass.

Yet experience in California and elsewhere shows that, on their own, production incentives are not a complete panacea, and are often not sufficient to bring projects to fruition. Without a PPA from a credit-worthy buyer that will, when combined with the state incentive, provide sufficient revenue certainty to the project, project completion rates will languish. Therefore, if the goal is to bring new renewables capacity on line quickly, production incentives should be designed carefully. For example, production incentives might be awarded only to projects that have identified, or that are very close to identifying, a willing and credit-worthy buyer of their power. Stringent bind bonds and project milestones can also improve project completion rates.

This case summarizes California's pioneering efforts with its production incentive program, and the difficulties it has faced. The case then turns to a discussion of how Pennsylvania's much smaller production incentive program has been designed to overcome some of the challenges that have faced California's program. Though direct comparisons between the two programs are difficult and perhaps even inappropriate given somewhat conflicting program objectives, the design and early results of Pennsylvania's program are encouraging, suggesting that Pennsylvania's approach may be somewhat better suited to bring new wind power capacity on line in a short period of time.[1]

[1] In addition to California and Pennsylvania, other states that have offered production incentives to large projects include Montana, New Jersey, New York, Oregon, and Rhode Island.

California

In June of 1998, the California Energy Commission (CEC) pioneered the use of production incentives to support large-scale renewable energy projects when it auctioned off $162 million in 5-year production incentives to 55 projects totaling roughly 550 MW of new renewable capacity. Three of the projects were expected to come on line in 1998, 22 in 1999, 17 in 2000, and the remaining 13 in 2001.[2] As of June 2002, however, 5 of the original 55 projects had withdrawn from the program, while 30 of the remaining 50 projects had come on line, adding roughly 178 MW of new in-state renewables capacity. In other words, 4 years after the first auction, nearly half of the projects (accounting for roughly two-thirds of the capacity) funded in that auction have not been built.

Since the initial June 1998 auction, the CEC has held 2 additional auctions in response to the state's electricity crisis:

- In November 2000, the CEC auctioned off $40 million of 5-year production incentives in support of 17 projects totaling 471 MW. This auction included a 10% bonus/penalty system to encourage projects to come online prior to the summer of 2001. As of June 2002, 6 of these projects totaling 25 MW have come on line.
- In August 2001, the CEC auctioned another $40 million in support of 9 projects totaling 300 MW. This auction also included a 10% bonus/penalty system to encourage projects to come online prior to the summer of 2002. So far, none of these projects have been built.

In aggregate, then, since June 1998 the CEC has awarded $242 million (through a weighted average 5-year production incentive of 0.8¢/kWh) in support of 81 projects totaling roughly 1,300 MW of new renewables capacity. As of the end of June 2002, 36 projects totaling 203 MW have come on line. This low level of project completion is not overly encouraging, and is due to a variety of factors, including: a notable lack of credit-worthy purchasers of project output (exacerbated by California's electricity crisis); permitting hurdles; and a high degree of market uncertainty – even before the electricity crisis began – that in retrospect contributed to optimistic and aggressive bidding behavior by developers. Each of these three factors is explored in more depth below.

- **Lack of Credit-Worthy Purchasers of Project Output:** The main culprit behind California's struggle to see new renewables projects built is a perverse lack of demand. California's electricity crisis destroyed the green power market and concentrated all power purchasing in the hands of the Department of Water Resources (DWR), which signed only a handful of contracts for renewable energy (representing just 1.5% of the total power the DWR has contracted for over the next decade). With the DWR now facing a power glut, and two of the three major investor-owned utilities in the state struggling to regain an investment-grade credit rating, developers of new projects have largely been unable to secure the long-term contracts they need in order to obtain suitable financing and develop their projects.

  California's experience demonstrates that even with generous production incentives, revenue uncertainty can still plague a project. In addition to providing effective incentives, state funds must remain mindful of the need for projects to secure PPAs with credit-worthy counter-parties. One potential remedy to the problem of revenue uncertainty is to provide incentives directly to utilities or other credit-worthy power purchasers that buy project output rather than to the projects themselves, as discussed in a separate case study on the UK's Non-Fossil Fuel Obligation. California is currently planning a slight variation on this theme,

[2] Winning bidders were given until the end of 2001 (i.e., 3.5 years) to bring their projects on line, or else risk losing their incentive award.

whereby the state's investor-owned utilities would be required to contract for renewable power at market prices, and state production incentives would be paid to renewable generators to cover any remaining above-market costs. Oregon's clean energy fund, meanwhile, has recently issued a wind power solicitation with the same structure as that being planned in California. Yet another solution, however, is to use discretion (combined with strong milestones and bid bond requirements) to select projects that have secured (or are close to securing) a long-term PPA, as Pennsylvania has done (discussed below).

- **Permitting Hurdles:** Even projects that are able to secure PPAs may be denied construction permits or be significantly delayed at the permitting stage. For example, 2 of the 4 geothermal projects funded in the CEC's first auction have negotiated PPAs with the Bonneville Power Administration, yet have not been built due to planning opposition from local Native Americans and environmental groups. A lack of familiarity with the issues surrounding renewable energy technologies, typical NIMBY responses, local political considerations, and even inadequate staffing at permitting agencies can all raise permitting hurdles that might stymie a project.

- **Market Uncertainty and Aggressive Bidding:** One must recognize that the CEC's production incentive program, as well as the evolving electricity market environment in which it has been operating, are both unprecedented. At the time of the first auction in June 1998, no one could have predicted the strength (or lack thereof) of the newly competitive electricity market, the degree of demand for green power, the extent of the "green" premium that renewable generators might earn, or the electricity crisis that would eventually destroy the market. Within this first-of-its-kind and constantly changing market environment, both the CEC (in designing its auction) and renewables developers (in bidding into the auction) were forced to operate on the assumption of a stable market.

  In retrospect, of course, this turned out to be a bad assumption, and it is likely that some of the bids in the first auction were based on an overly optimistic assessment of market demand and PPA availability. It is also quite possible that the flexible and lenient design of the first auction may have enabled developers to bid aggressively without fear of substantial recourse. In particular, while the CEC's bid bond requirement (10% of the full 5-year production incentive requested) is intended to discourage blatant "speculative" bidding, the rather lenient refund policy (relative to Pennsylvania, see below), whereby the full bond is refunded once a project files for permits, makes it relatively painless for developers to opt out of successfully bid projects that no longer look as attractive as they once did. Additionally, the CEC's approach to selecting projects based largely on the level of the incentive bid (and not on other factors that might affect project completion) may have helped exacerbate this aggressive bidding phenomenon. While aggressive bidding is not, by itself, troublesome, and in fact may be highly desirable in an auction setting, if a program's ultimate goal is to see renewable energy projects proceed towards construction quickly, then there is a need to balance aggressive or overly optimistic bidding with a certain degree of realism. Requiring more stringent forms of security is one way to accomplish this.

While these are just a few of the reasons that project completion rates have languished in California, it should be noted that the CEC's program was not necessarily designed to bring projects on line rapidly or within an unstable market. Instead, California's program was designed to allow all renewable technologies to compete for funds, and as such incorporated

a relatively high degree of leniency to accommodate the needs of a diverse set of technologies. For example, developers funded in the first auction were given 3.5 years to develop their projects – more time than typically needed to develop a wind plant, yet perhaps barely enough time to develop a geothermal project. In this and perhaps several other ways, the CEC's program was designed with the "lowest common denominator" (e.g., longest development time) in mind. The program was also designed to be market-based, with the auctions structured to reward the most cost-competitive (i.e., lowest bid) projects rather than to guarantee that projects would be built (leaving that decision up to the market). This overall strategy differs markedly from that employed in Pennsylvania, where the program's main objective was to bring wind power projects (i.e., a single technology) on line before the scheduled expiration of the federal production tax credit (PTC) for wind power at the end of 2001 (i.e., a little over a year from the auction date).

Pennsylvania

As part of the PECO/Unicom merger settlement, the Sustainable Development Fund (SDF) in PECO's service territory received $12 million to support the development of new wind power in Pennsylvania. In September 2000, the SDF issued a $6 million "Phase I" competitive solicitation for new wind power, offering 5-year production incentives capped at 1.5 cents/kWh (i.e., modeled after California's program). A dozen or so projects totaling roughly 150 MW of new wind capacity responded with bids.

After narrowing the field to just a few projects and consulting with these bidders, however, the SDF determined that it could increase its leverage and the number of MW installed by effectively providing a lump sum payment (contingent on production) payable upon the commercial operation of each project. Through this novel arrangement, the SDF provides the developer with the full projected 5-year incentive amount upon commercial operation, and in return the developer provides the SDF with a letter of credit for that amount. As the wind project "earns" its incentive over time by producing energy, the amount of funds secured by the letter of credit is reduced accordingly until either the project earns the full incentive amount or the 5-year incentive period expires (in which case the project forfeits any remaining un-earned incentives).[3]

Two projects, totaling 67 MW, were announced as winners of the solicitation in early 2001. The 15 MW Mill Run project (awarded $2 million or 1.2¢/kWh) in western Pennsylvania came on line in October 2001, while the 52 MW Waymart project (awarded $4 million or 0.8¢/kWh) near Scranton has been delayed by certain local opposition. Both projects have secured 20-year PPAs from Exelon's wholesale Power Team. Even with the production incentive, the PPAs are priced at above-market rates; Exelon intends to make up the difference through premium green power sales. As such, Exelon has reached an agreement with Community Energy, Inc. to market the wind power at a premium to both commercial and residential retail customers. Community Energy has already sold essentially all of the output of the 15 MW Mill Run project (along with that of the 9 MW Somerset project, described in a separate case study on subordinated debt financing) mainly to institutional and commercial buyers in the state.

While only one of the two funded projects had come on line by September 2002, the basic design of SDF's production incentive program, as well as the health of the overall electricity market within the region, appears

[3] One of the winning bidders has received a definitive private letter ruling from the IRS that this up-front production incentive will not offset the value of the federal production tax credit. The ruling, however, is based largely on SDF's non-governmental status and the fact that the funds in question came from a utility merger settlement (i.e., private rather than public capital). Since these conditions are case-specific, other clean energy funds would be wise to seek advice from the IRS – or more appropriately encourage funded projects to do so – if they were to consider offering up-front production incentives.

likely to result in faster project completion than in California. Several enabling factors (both internal and external to the program) deserve mention:

- **Stable Demand:** Unlike California, Pennsylvania offers multiple markets in which to sell wind power, making at least one credit-worthy wholesaler (Exelon) more comfortable in entering into long-term PPAs, which are critical to the success of wind projects. Pennsylvania's restructured electricity market has remained relatively stable compared to that of California, and the state's green power market also remains functional. In addition, funded projects are permitted to sell their output into the New Jersey renewables portfolio standard (RPS) if desired. The presence of demand from multiple markets allows developers and market participants to proceed with new projects in an environment of relative certainty.
- **Discretion to Choose the Best Projects:** The SDF employed considerable discretion in selecting projects that were both able to demonstrate low required incentive levels *and* a high probability for project completion by the end of 2001. To evaluate projects based on the latter metric, the SDF asked bidders to provide information demonstrating: financial health, ability to finance a large wind energy project, technical ability to construct and manage a large wind energy project, site control, feasibility of interconnecting the proposed project with the electric grid, wind resource adequacy, ability to secure all required permits within four months of award, and, perhaps most importantly, *progress towards securing a power purchase agreement*. These criteria are more comprehensive than those employed in California – where the CEC selected winning projects from among the pool of qualified bids based solely on the level of incentive requested[4] – and may have contributed to Pennsylvania's success in bringing new wind capacity on line in a short time period. Of course, the small size of Pennsylvania's program ($6 million in support of a single technology) relative to California's program ($242 million in support of a diverse set of technologies) facilitates the use of discretion in evaluating project bids.
- **Bid Bond Milestones:** Pennsylvania's bid bond system differs from California's in one critical respect. Though the level of security provided – at $2,500 per MW of project – is only about 20% as large as California's requirement, the refunding milestones are more stringent: one third of the bid fee is refunded once the project has secured all permits, a second third is refunded once the project has secured financing, and the final third is only returned once the project has commenced commercial operation. This is in contrast to California, where the entire bid bond is refunded at the time the project applies for permits. Again, this difference in bid bond design is perhaps reflective of the different philosophies employed by California and Pennsylvania in designing their respective programs: whereas California has relied largely on market discipline to ensure that projects are built, Pennsylvania has chosen to maintain greater leverage over its funded projects in an effort to encourage rapid completion.
- **Up-Front Incentive:** The "up-front" nature of the incentive leverages its value, due to the time value of money. If one assumes that the wind developer's cost of capital exceeds the SDF's opportunity cost of capital by 10%, this up-front lump sum approach boosts the incentive's leverage by 32% (in this case, enabling an additional 16 MW) compared to a production incentive distributed over 5-years. If the cost of capital differential is 5%, a 15% (or in capacity terms, 9 MW) leverage boost could be expected. It is

[4] Qualified bids are those that satisfactorily included an estimate of energy production over 5 years and a forfeitable bid bond, as well as demonstration of eligibility to bid, site control, and project feasibility.

worth noting that this novel approach has also been recognized by SDF's peers as being innovative and worth emulating: in their latest solicitations for grid-supply projects, both New York and Rhode Island have indicated a willingness to structure an SDF-style up-front production incentive if requested by the successful bidder.[5]

[5] Montana's fund also tried to use a variant to this approach; in this case, the fund was to deliver an up-front payment to a wind project in order to secure a lower and fixed PPA price for the power output. Though the wind project is now on-hold, the payment was to be made after the project was up and running and "accepted" by the utilities involved.

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About this Case Study Series

A number of U.S. states have recently established clean energy funds to support renewable and clean forms of electricity production. This represents a new trend towards aggressive state support for clean energy, but few efforts have been made to report and share the early experiences of these funds.

This paper is part of a series of clean energy fund case studies prepared by Lawrence Berkeley National Laboratory and the Clean Energy Group, under the auspices of the Clean Energy Funds Network. The primary purpose of this case study series is to report on the innovative programs and administrative practices of state (and some international) clean energy funds, to highlight additional sources of information, and to identify contacts. Our hope is that these brief case studies will be useful for clean energy funds and other stakeholders that are interested in learning about the pioneering renewable energy efforts of newly established clean energy funds.

Twenty-one total case studies have now been completed. Additional case studies will be distributed in the future. For copies of all of the case studies, see:
http://eetd.lbl.gov/ea/ems/cases/ or http://www.cleanenergyfunds.org/

About the Clean Energy Funds Network

The Clean Energy Funds Network (CEFN) is a foundation-funded, non-profit initiative to support the state clean energy funds. CEFN collects and disseminates information and analysis, conducts original research, and helps to coordinate activities of the state funds. The main purpose of CEFN is to help states increase the quality and quantity of clean energy investments and to expand the clean energy market. The Clean Energy Group manages CEFN, while Berkeley Lab provides CEFN analytic support.

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