

Bidding The Green: Incentivizing New Renewable Power Development in California

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ABSTRACT

Recent legislation in California established a program to provide about 162 million dollars in incentives to new renewable power plant projects built in the state. Which new projects get these incentives is determined by an auction where renewable power developers will bid for cents/kWh incentives, with the lowest requests winning the auction. Winners of the auction get production incentives, not to exceed 1.5 cents per kWh, for renewable kWh generated for the first five applicable years of plant operation. These incentives for new renewable development are only provided after the project developers find financing, go through a series of permitting and construction steps, and find customers for their power in the restructured electricity market.

This paper describes the design of and the preliminary results of this unique auction process. The paper discusses including environmental, diversity, and other values in the auction, compares the auction to a previous resource auction in California, and provides a preliminary discussion of the results of the auction -- what types and amounts of new renewable resources are expected to be built with these incentives. The paper also discusses the link to development of a green market for electricity in California.

Introduction And Background

In 1998, California begins a new world of competition in the electricity industry. Legislation enacted in 1996 establishes a four-year transition period to competition. During this transition, the state's major investor owned utilities have an opportunity to recover stranded costs and the state's ratepayers will continue to contribute to public-purpose programs (stranded benefits), including energy efficiency, research and development, renewable generation, and low income programs. This paper describes the development of policies to provide incentives for the construction of new renewable electricity power plants in California during the transition to a competitive market for electricity.

California's Renewables Industry

Over the past decade and a half, California has developed the largest and most diverse renewable generation industry in the world.¹ California has nearly 6600 megawatts (MW) of independently-owned and utility-owned renewable power capacity, including solid-fuel biomass, geothermal, wind, small hydroelectric (30 MW or less), solar, landfill gas, digester gas, and municipal solid waste (MSW) facilities. These facilities are estimated to have produced 26,000 gigawatt hours

¹ California law excludes hydroelectric facilities greater than 30 MW in the definition of renewable energy.

(gWh) in 1994, representing approximately 12 percent of the electricity used in California. Figures 1-1 and 1-2 show the relative capacity (MW) and generation (gWh) shares, respectively, of the technologies comprising the California renewable power industry.

Most non-utility renewables in California were built under long-term contracts which provided fixed energy (per kilowatt hour) payments for 10 years (based upon the IOU's forecasted avoided energy costs over that period) as well as fixed capacity payments (per kWh).^{2,3} Guaranteed energy and capacity payments helped to attract financing for independent energy projects. Avoided energy and capacity prices have been significantly lower than the forecasts included in these contracts, hence as the 10-year period of fixed energy payments ends, renewable power plants will receive significantly less revenue for their energy. Already, renewable generation has decreased in California, in contrast to regular increases throughout the late 1980s and early 1990s. Nearly 20 biomass plants comprising 200 MW of generation have gone off-line. Wind capacity has decreased by over 100 MW since 1993. Further decreases would be expected if energy prices remain low.

Renewables In Transition to Competition

In response to the declines in existing renewable capacity, and the lack of any new renewable power plants being built, California has established transitional support for renewables as part of its broad move towards competition in the electricity industry. Assembly Bill 1890 (AB 1890), enacted on September 23, 1996, set the stage for a competitive electricity industry and provided \$540 million for the support of renewable electricity generation technologies.⁴ The purpose of this funding was to support existing, new, and emerging renewable electricity generation technologies, and continue to secure the benefits of these technologies for California.^{5,6}

Because of the increasing competition in the electricity industry, this transitional funding was to be distributed using market-based mechanisms as much as possible, rewarding the most cost-effective and competitive renewable technologies. The legislature also directed that at least 40 percent of the total funds be allocated to existing renewable power plants, and at least 40 percent to new power plants and emerging renewable technologies.

AB 1890 directed the California Energy Commission to prepare and submit a Policy Report⁷ to the Legislature with recommendations for allocating the \$540 million. In 1997, Senate Bill 90 (SB 90) was enacted adopting the majority of the Energy Commission's recommendations, and containing explicit directions for distributing the renewables funding through four distinct accounts: Existing Renewables Resources Account, New Renewable Resources Account, Emerging Renewable Resources

² Avoided energy costs are estimates of the utilities' energy procurement costs that would have been incurred were it not for the energy provided under the contracts.

³ Fixed capacity payments are provided in SO₂ and ISO₄ contracts for the life of the contract, which is often as much as 30 years.

⁴ See Section 383, Chapter 2.5, Part 1, Division 1, Public Utilities Code, Enacted into law by Assembly Bill 1890, Chaptered on September 26, 1996.

⁵ Op Cit., See Section 383.a.

⁶ The benefits of renewables, depending on the particular technology and application, can include: improving air quality, enhancing energy security, suppressing forest fires, reducing landfill materials, and mitigating open-field agricultural burning, and improving peak generation and system reliability.

⁷ *Policy Report on AB 1890 Renewables Funding*, published March 1997, publication number 500-97-002.

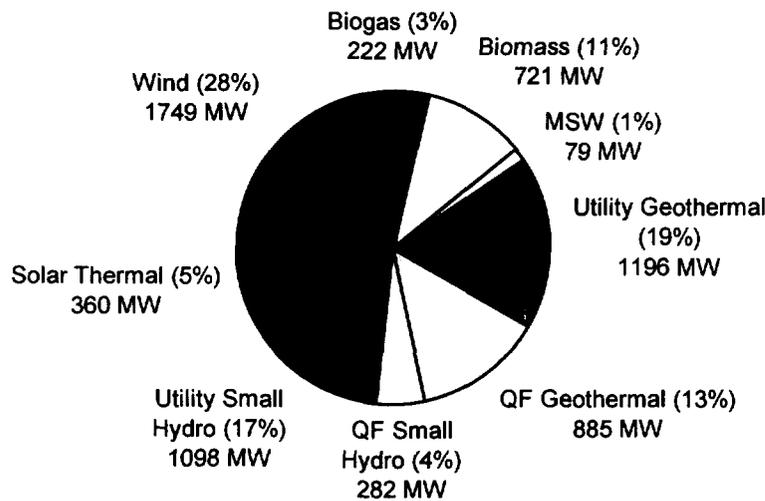


Figure 1. California's In-State Renewable Capacity 1996 (Estimated)⁸

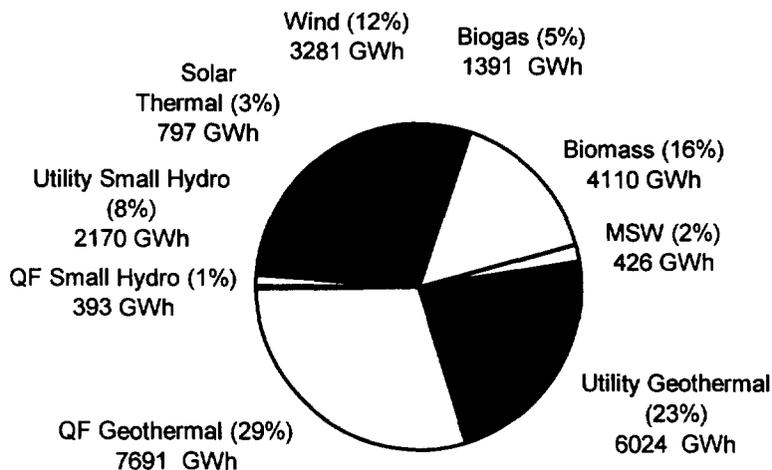


Figure 2. California's In-State Renewable Generation 1994 (Estimated)⁹

⁸ This figure includes estimates of both utility-owned and non-utility owned capacity, but no self-generation. Qualifying Facility capacity is based on the Energy Commission's QF database that includes data from the utilities' quarterly status reports on small power producers.

⁹ This figure includes estimates of both utility-owned and non-utility owned renewables generation, but no self-generation. Sources for data were *Renewables Working Group Report, 1994 Electricity Report Appendices*, and the Energy Commission's Qualifying Facility Database.

Account, and Customer-Side Renewable Resource Purchases SubAccount. Table 1 shows the percentage funding allocations to these accounts (allocations vary by year, but average out to the percentages shown).

Table 1. Allocations to Renewable Accounts

Account	Percent	(in millions)
Existing Renewable Resources	45%	\$243
New Renewable Resources	30%	\$162
Emerging Renewable Resources	10%	\$54
Customer-Side Renewable Resource Purchases	15%	\$81

The Energy Commission has developed more detailed implementation protocols for each of these accounts, described in a **Guidebook for the Renewable Technology Program**.^{10,11} This paper describes the policies developed to allocate \$162 million in support for new renewable power plants in California - the policies governing the New Renewable Resources Account.¹²

Overview of Auction

The allocation mechanism for the New Technologies Account is a first-price auction to allocate the \$162 million in the New Renewable Resources Account. Bidders will bid for the amount of production incentive payments they desire (up to 1.5 cents/kWh), and winners and losers are determined based upon these simple cents per kilowatt-hour incentive requests in the qualified bids received.

Bidders in the auction must submit bids that refer to an eligible project, meaning one that is: 1) located in California, 2) renewable as defined in California law, and 3) new, or first placed in operation or substantially repowered on or after September 26, 1996. Bids determined qualified will be ranked in order of lowest incentive request to highest. Beginning with the lowest request, bids will be accepted as winners until funds are depleted or all bids have been accepted. The incentive requests and the amount of estimated generation (over five years) in the bids will be used to determine when or whether funds in the account are fully allocated in this auction.

Winners receive the incentive payments per kWh that they bid, not an amount determined in part by other bids as in a second-price auction. Winners are paid these incentive payments only for the first five applicable years of generation sold in the competitive market, implying that the market, not the incentive payments, will almost certainly provide the majority of the revenues successful projects

¹⁰California Energy Commission, Guidebook for the Renewable Technology Program, Volumes 1-4, and Overall Guidelines, publication numbers P500-97-011V1-4 and P500-97-012.

¹¹The Guidebook is divided into four volumes, one for each account. The volumes are: Volume 1 -- Existing Renewable Resources Account, Volume 2 -- New Renewable Resources Account, Volume 3 -- Emerging Renewable Resources Account, Volume 4 -- Customer Credit Subaccount of the Customer-Side Renewable Resource Purchases Account. Overall guidelines (administrative protocols) are in a separate volume.

¹²For more details about the auction, see: Notice of Auction, New Renewable Resources Account, NOA #500-97-506, California Energy Commission, March 1998

will receive. Winners must proceed through a series of milestones leading to completing construction of their projects and coming on-line as an eligible renewable generator prior to receiving any incentive payments.

Bid Requirements

Bids in the auction must contain standard items such as bidder identification (name, address, etc.) and declaration by signature of authorized representative that the information in the bid submitted is valid and refers to a project eligible to bid. In addition, bids must contain the following relatively simple information and other requirements:

The Cents/kWh Incentive Payment Requested. The cents/kWh incentive payment requested is the one piece of bid information that will be used to rank bids -- from lowest incentive request to highest, with those with the lowest incentive requests considered first in the auction.

The Estimated Generation Over Five Payment Years. Bidders must, to the best of their ability, accurately estimate the level of generation that their proposed project will be able to provide over the five years that incentive payments will be received. This estimate will be used in the auction to determine the point at which the New Technologies Account funds are expected to be fully allocated and consideration of bids will stop. Purposeful underestimation and overestimation of expected generation will be discouraged by limits on incentive payments and penalties.

Bid Bond. Bidders must also include a bid bond equal to 10 percent of the expected total incentive payments in the bid.¹³ The bid bond is intended to guarantee that the bidder is proposing a serious, viable project that is fully expected to be built upon winning the auction, not to guarantee performance throughout the construction or during the operation of the project. A bid bond is often used in private market solicitations, in part to avoid heavy-handed administrative evaluation of bids.

Demonstration Of Site Control And Project Feasibility. A bid must contain a description of the proposed project, including the exact location, evidence that the location can be used as proposed and is available or controlled by the bidder, expected capacity, technology and fuel type(s), expected transmission access, the permits expected to be required and the expected schedule for permit approval, the financing structure, the project construction schedule and expected on-line date, and any other relevant information.

Auction Rules

The auction has relatively simple rules, or protocols, for determining the results. Of course, bids must be received at the right place at the right time and have the required information included. The major rules are:

Only One Bid Per Project. The bid bond required should be sufficient to deter submittal of multiple bids, where bidders may be strategically expecting to subsequently go forward with only the most favorable bid. However, in the event that multiple bids are received for a project the Energy Commission will only accept the one with the lowest incentive payment request.

¹³ Ten percent of the cents/kWh incentive request times the total expected energy in the bid.

Bids Included From Lowest Incentive Payment Request To Highest. This simple ordering and decision criteria lowers bidding costs and chances of gaming. Bidders get what they ask for in incentive payments.

Maximum Size Of Bid. Bids will not be accepted if the total incentive requested, or the incentive payment times the expected generation for five years, exceeds 25 percent of the account funds (\$40.5 million).

No Tie-Breaking. Bids with equal incentive payment requests will be added as a group to the list of winning bidders, as if they are a single bid. The auction will not attempt to break ties through additional bid criteria beyond incentive payment requests. This again simplifies administration of the auction and avoids gaming by avoiding consideration of secondary characteristics of bids during a complicated tie-breaking procedure.

Closure By Downsizing. If a bid or group of bids under consideration causes the available funds to be exceeded, the auction will be closed by reducing the projected generation amounts in the bids under consideration by a percentage amount that will result in the available funds (\$162 million) being fully allocated. Bidders whose bids are reduced will be given the option of withdrawing their reduced bids from consideration. Any leftover funds from bids that are withdrawn will be held, and not reallocated through some process in this auction.

No Exhaustion Of Funds. When the auction is closed, any remaining funds in the account will be held in trust for reallocation at a later date. The auction will not attempt to fully use the allocated funds by, for example, considering additional bidders if funds are available. Any leftover funds will be reallocated in either a subsequent auction for new renewable power plants or moved to one of the other renewable program accounts as determined by the Commission, with consideration of market conditions and status of the accounts at the time.

After the Auction

Winning projects will be required to meet a series of project development and construction milestones, described in Table 2, between the auction and the expected on-line date, and to submit quarterly reports to the Commission describing their progress. After the auction, winning bidders and Commission staff will work together to develop *project award packages* for each winning project, documenting the winning project's eligibility, status as auction winner, applicable milestones prior to payment, and expected payment amounts and schedule.

The schedule for subsequent milestones included in the project award package may be driven in part by factors related to specific projects or technology types or by other renewable program initiatives. For example, projects that are capable of proceeding through their milestones and coming on-line quickly may be able to sell power more easily to consumers who are also participating in the Customer Credit Subaccount (which ends in 2001). Also, projects coming on-line prior to specific dates may be eligible for specific Federal tax credits or other incentives.

Projects are expected to go from award to completion unaltered from their original proposal; that is, projects are expected to be designed and proposed as feasible, permittable, serious projects. The Energy Commission, however, recognizes that some project changes may be required due to permitting requirements or events that are unforeseen by the bidder. The Energy Commission must be notified in advance in writing of any proposed change in a winning project while the incentive program is pending or operational for that project. Changes determined to have a material bearing upon the purposes or

process of the incentive program may result in penalties, forfeiture of incentive payments, or termination of grant awards to the project.

Table 2. General Description and Expected Timing of Milestones

Milestone	Description	Expected Timing: Months After Auction
Milestone #1: Project Award Package Adopted	Energy Commission receives complete package documenting project and approves project award.	3-12 Months
Milestone #2: Project Applications Filed	Filing of all relevant project construction applications, including filing for any environmental and land-use permits.	3-18 Months
Milestone #3: Project Approvals Obtained	Approval of all relevant project construction applications, including any environmental and land-use permits.	3-27 Months
Milestone #4: Project Construction Started	Beginning of construction of the project. Foundation or piling work begins, or major equipment is delivered on-site	3-30 Months
Milestone #5: Project Construction Progress Check	A checkpoint in the ongoing construction of a project, with the exact date and checkpoint defined in the project award package	3-36 Months
Milestone #6: Project Completed & On-line	The on-line date is the start of normal operation of the project, after any shakedown period, if necessary.	3-48 Months

Designing The Auction

The Energy Commission decided that a fixed production incentive, facilitating project financing by providing a guaranteed portion of the revenue stream for a newly constructed renewable generator, was the best mechanism to allocate the AB 1890 funding. This mechanism ensures that 1) funds are only expended on projects that produce, or are built and generating renewable power for sale in the competitive market, and 2) the decisions about which technologies to build, or whether to build particular power plants, would be left primarily to market participants. In particular, the decision about whether to finance a particular plant would be left to the market without loan guarantees or financing support, mechanisms that were perceived to lead to inefficient duplication of market decisions as applications for financing support are considered, or to risk reduction that could lead to poor market decisions, or both.

However, we still needed a way to determine how much of a production incentive to provide. Choosing the target incentive levels administratively is difficult, because there is little information available about the kind and costs of facilities that would be built with these incentives in mind. We felt that a simple bid process, establishing a competition among prospective participants, would be the least complicated and administratively intrusive and most market-based method of determining the appropriate incentive levels. Alternatives would involve requiring prospective participants to submit significantly greater amounts of information, which could then be used to determine incentive levels, or simply setting incentive levels without this information, and preparing to administratively adjust the levels as they prove too high or too low. In sum, bidding for the amount of the incentive in the new account: 1) allows market participants and conditions to set the incentive levels, and 2) eliminates the need to administratively and arbitrarily determine incentive levels, with the commensurate potential for ongoing administrative reevaluation.

With a bidding methodology to determine the incentive levels, we thought about whether to have target market prices included in the bids, with incentives that vary depending on market price, or to simply have a guaranteed, constant incentive, unrelated to market prices. It turned out that certainty was as important for the bidding process as it is for project financing.¹⁴ A incentive related to target market prices would have the advantage of correcting for excess incentives when market prices were high, and is more similar to our payment method in the Existing Account. However, it provides no certainty about how funds will be spent, and consequently, makes it difficult to determine during the auction exactly when the account funds would be exhausted and we would stop accepting bids. In sum, we chose the guaranteed constant incentive because we could relatively easily tell when to cut-off bidding (when funds are exhausted), and because it was administratively simpler.

Previous Auctions - BRPU

Our auction differed from the BRPU bidding process in at least two significant ways. First, our bids were for production incentives, not for the entire revenue stream of a project. We expect the market to account for most of the revenue stream, including any differential energy or capacity value resulting from the location or generation profile of the facilities. Consequently (and thankfully), we could keep bids much simpler, avoiding, for example, a bid scoring process that took into account four distinct parts of the BRPU bids: energy costs, energy-related capacity costs (ERCC), peak capacity costs (represented by shortage cost bids), and transmission costs, and avoiding related calculations involving energy loss factors (ELF), peak period capacity factors and load factors, and transmission costs factors, etc. Table 3 illustrates the difference in bid simplicity.

Second, we chose a first-price rather than a second-price auction process.¹⁵ Part of the reason for the BRPU complexity was an attempt to collapse the complex set of values that comprise electricity generation into one 'bid score' that could be ranked for purposes of determining the results in a second-price auction. (Gribik, 1995) It proved problematic to have such a bid scoring process to determine auction results, when actual payments were calculated with a slightly different formula involving the

¹⁴ A constant guaranteed incentive provides more certainty about revenues to the bankers and other market actors that will be making decisions to finance these new power plants.

¹⁵ In a second price auction, all winning bidders receive payments requested in the bid of the first losing bidder - that is, all winners receive more payments than in their own bids. Theoretically, this allows bidders to bid their "true" costs, without inflating their bids in an attempt to capture economic rent in the auction, and therefore leads to lower payment requests in bids.

bid components. We chose a first-price auction because it was less complex and as a result held fewer opportunities for a design mistake that could be exploited by bidders and because we felt that there were fewer potential problems after the auction if the prices that bidders received were independent from other bids, rather than dependent on them.

Table 3. Comparison of Bidding Simplicity

Auction	Bid Scoring Rule
BRPU	$\text{Bid Score} = \frac{\text{cents/kWh bid}}{\text{ELF}} + \frac{\text{ERCC bid}}{\text{hours} \times \text{ELF}}$ $+ \frac{\text{shortage cost bid} \times \text{multiplier}}{\text{peak hours} \times \text{peak CF} \times \text{CLF}}$ $+ \frac{\text{ramped 1st year transmission costs}}{\text{capacity} \times \text{hours} \times \text{ELF}}$
NRRRA Auction	$\text{Bid Score} = \text{cents/kWh bid}$

We felt that the relative simplicity of the bid process in the New Renewables Account auction will avoid a significant amount of the gaming that appeared in the BRPU auction, and contributed to its rejection by regulators. We understood that bidders would bid strategically in our auction as well, but expected that complex gaming strategies such as the negative-energy cost bids found in the BRPU would not be fruitful. Our dependence on the market to adjust for the cost or value of such things as capacity value, generation profiles, and transmission rights or availability implies that the auction may induce different resources than if we tried to administratively value and include these in the auction process. Our hope is that the resources induced will be more likely to be built in the competitive market if the market has a major role in the valuation process.

Including The Electricity Market

Two unique aspects of this auction derive from the goal of supporting new renewable development using market based mechanisms, so that the new projects can feasibly participate in the competitive electricity market. First, the auction is for a limited production incentive amount (not to exceed 1.5 cents per kWh) rather than for the entire revenue compensation for a proposed project. Winning projects are expected to sell the electricity they generate for whatever price it can command in the electricity marketplace, and are not entitled to incentive payments without proof of electricity generation and sale. Previous resource auctions occurred in an era when utilities bid for resource supply, and consequently were expecting to pay winners most, if not all, of their revenue stream.

Second, ancillary aspects of particular projects, such as transmission constraints or capabilities, capacity value, environmental benefits, and reliability benefits will not result in differential evaluation of bids or administratively-determined differences in the amounts of production incentives. Bidders

must evaluate and rely on the prospects for market valuation of such characteristics, or prospects of having that value reflected through other programs. For example, the Customer-Side Renewable Resource Purchases Account will provide incentives for consumers in California to purchase eligible renewable energy from 1998 through 2001. These incentives may facilitate development of a "green market" in California, decreasing the transaction costs for viable sales of renewable power generated from facilities that come on-line while these incentives are being paid, or in the green market that remains after these incentives end. In addition, other policy initiatives may be enacted that will convey a value, through the market or otherwise, for differing environmental costs among resources.

Finally, as in other auctions, the incentive level for the new account is also determined by the market participants through their bids for support, rather than administratively. While the bidding will be a simple administrative process, similar to a market-making process, it is the bidders themselves, accounting for their own estimates of market prices and conditions, that will determine winners and losers and incentive levels. This auction includes an upper limit on incentive payment bids of 1.5 cents/kWh, so that the payments remain secondary to market decisions.

Results

Bids in the New Renewable Resources Account auction were due on or before June 5, 1998. Fifty-six bids were received, more than many stakeholders expected, and it is expected that as the bids are evaluated most, if not all, of the available \$162 million will be in play. Detailed results of the bidding are being held confidential until evaluation is complete, and should be available within one month of the auction date. Of course, the exact amount and type of renewable generation induced by the auction will not be known for years, until the plants are built and begin generating, but enough information will be available to provide increasingly confident estimates of the results by late summer of this year.

Since the auction does not reserve funds for any particular technology, there was some concern that a diversity of renewable technologies would not be represented in the new capacity induced through this program. While diversity was not a major goal of the program, it was hoped that the process would lead to a variety of new renewable power plants, not just one or two types. Given the latest cost estimates for renewable technologies and differences in construction lead time and permit requirements among technologies, we expected that the auction would include a variety of technologies. Our preliminary results indicate that our expectations were reasonable; the projects that were bid represent a variety of resource types, including geothermal, wind, landfill gas, biomass, digester gas, and small hydroelectric projects.

There was also concern that the auction did not have high enough incentives to induce significant participation by prospective new renewable generators. While designing the auction, stakeholders argued for a higher maximum incentive than the 1.5 cents/kWh limit chosen, or for a longer payment period for incentives - ten years rather than the five years chosen. As it turned out, a significant amount and variety of new renewable generation appears ready to test the new waters of the competitive market with the prospect of an average production incentive of about 1.2 cents per kWh for five years, twenty percent below the maximum chosen for the program. The bids received appear sufficient in number to fully allocate the available funds, leading to lower incentive payments in general and a larger number of MW of new renewable capacity eventually being built.

Conclusions

AB 1890 support can reduce or reverse the declining trend in renewables generation in California. The New Renewable Resources Account, using an auction to allocate incentives for development of new renewable power plants in the state, will contribute significantly to a new, more positive trend in the development of renewable generation over the transition period from 1998 to 2002, and result in renewable generation that is more tuned to and able to survive in the competitive market after the transition period. generation can successfully compete in a restructured electricity market.

The interim results of the New Renewables auction indicate that the cost of renewable power is closer to being competitive than many have thought. This is either further evidence that renewable generation costs have declined over the last decade, bringing cleaner power close to competitiveness with fossil-fuel generation, or evidence that the prospects for consumer choice of renewable power in a competitive market are considered high, or both. It is good news for the environment, and for California's electricity consumers.

In the long run, the support provided by AB 1890 will be most effective if we experience the development of a strong consumer base for renewable power. The choice afforded by increasing competition in the industry provides consumers an opportunity to vote their environmental values with their electricity dollars. This customer-driven market for renewable power currently exists today only on a small scale; time will be required to develop this market into a vibrant and reliable source of demand for renewable power. I believe that this will happen, and that the new renewable power plants participating in the New Renewable Resources Account will help to provide the enhanced supply for environmentally-friendly power that these consumers will demand.

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