Berkeley Lab and the Clean Energy States Alliance

CASE STUDIES OF STATE SUPPORT FOR RENEWABLE ENERGY

The Impact of State Clean Energy Fund Support for Utility-Scale Renewable Energy Projects

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CONTENTS

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The database from which the information in this report has been compiled can be found at http://eetd.lbl.gov/ea/ems/cases/Large_Renewables_Database.xls

Download other clean energy fund case studies from:

http://eetd.lbl.gov/ea/EMS/cases/

or

www.cleanenergystates.org

Introduction

At least fourteen states across the U.S. have established funds to promote the development and commercialization of renewable energy technologies. Most often financed by a small surcharge on retail electricity rates, these funds currently collect more than $500 million per year in aggregate in support of renewables. At this funding level, state clean energy funds are positioned to be a major driver of renewable energy development.

Though state clean energy funds have pursued a variety of approaches in the use of their funds, support for the deployment of utility-scale renewable energy projects – such as commercial wind, biomass, and geothermal projects – has been a principal target of most funds. This case study, and the database it describes, summarizes the support that clean energy funds have provided to utility-scale renewable energy projects in recent years, detailing – among other things – the amount of funds obligated and the number, capacity, and resource type of projects supported.

This case study focuses on projects supported by funds that are members of the Clean Energy States Alliance (CESA). CESA is a non-profit, membership-based, multi-state coalition consisting of most of the clean energy funds throughout the United States.[1] CESA provides information and technical assistance to its member funds, and works with them to develop and promote clean energy technologies and to create and expand the markets for these technologies.

The database on which this summary is based will be updated periodically to provide a running summary of state activity and influence. The Excel database contains information on all non-photovoltaic, utility-scale (defined here as 1 MW or larger in nameplate capacity), *new* renewable energy projects (whether currently on line

[1] Specifically, CESA consists of 18 funds in 14 states. More information is available at www.cleanenergystates.org.

or not) that have received (or been obligated) construction- or production-related financial support from CESA-member clean energy funds. The database does *not* include projects that have received only pre-development support; nor does it cover R&D or other non-deployment activities. In addition, several clean energy funds, including those in California and New York, now provide direct financial assistance to projects participating in each state's renewables portfolio standard (RPS) – the database *does not* include such RPS-related support.

The database includes both project and incentive information, to the extent readily available. Project information includes: project location, resource type (e.g., wind, geothermal, etc.), nameplate capacity, project participants (e.g., developer/owner), project status (i.e., online, pending, or canceled), online date (if applicable), and power purchase agreement (PPA) counterparty (if applicable). Incentive information includes: supporting clean energy fund, incentive type (e.g., grant vs. production incentive vs. loan), original and revised incentive amount, date of incentive award, solicitation name (if any), and treatment of the project's tradable renewable certificates (TRCs – i.e., whether the fund places any restrictions on the sale of TRCs from the project). Finally, in addition to reporting the incentive as it is actually structured, we also normalize all incentives to their equivalent 5-year production incentive value in order to facilitate broad comparisons across projects, technologies, and clean energy funds.

The remainder of this report provides summary information compiled from the database as of March 2006. For more detailed information on individual states or projects, see the actual database itself, which can be accessed at http://eetd.lbl.gov/ea/ems/cases/Large_Renewables_Database.xls.

Key Findings

1. State clean energy fund support for utility-scale renewable energy projects is significant.

Of the fourteen states with CESA-member clean energy funds, eight have provided construction or operational support to utility-scale renewable energy projects. As shown in Figure 1 and Table 1, since 1998, clean energy funds in these eight states have set aside or obligated more than $475 million in construction or operational support for 250 renewable energy projects totaling 2,642 MW. After accounting for cancellations – 16 projects totaling 393 MW have had their incentives canceled to date[2] – and penalties due to missed milestones, the total amount of funding currently obligated stands at nearly $400 million. So far, 178 projects totaling 1,116 MW have been built, while 56 projects totaling 1,133 MW are still in the development pipeline.

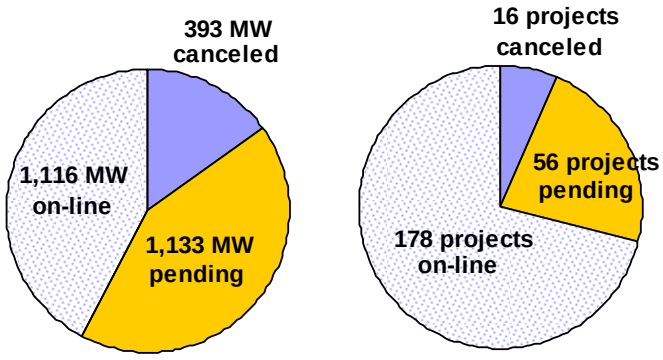

Figure 1. Status of Projects and Capacity Supported

[2] Four wind projects in New York account for 267 MW of the 393 MW that have had incentives canceled to date. These four projects agreed to forfeit their incentives, as required, in order to participate in New York's RPS. One of these four projects has since received support from NYSERDA under the state's RPS (in the form of a 10-year TRC purchase). As noted earlier, though, our database does not include this RPS-related support.

Table 1. Summary of State Support for Utility-Scale Renewable Projects (as of March 2006)

Project Location	# of Projects	Obligated Funding ($)		Capacity (MW)			
		Original	Current	Original	Canceled	Pending	Online
CA	60	$243,573,376	$189,970,791	1,291.5	64.5	748.5	478.5
IL	5	$8,425,000	$8,425,000	112.5	0.0	6.0	106.5
MA*	5	$32,756,736	$32,756,736	52.3	0.0	49.0	3.3
ME*	1	$5,600,000	$5,600,000	19.0	0.0	19.0	0.0
MN	147	$107,679,545	$107,679,545	253.3	1.7	35.3	216.3
NH*	1	$2,720,000	$2,720,000	50.0	0.0	50.0	0.0
NJ	6	$17,782,026	$14,682,026	38.9	21.0	6.9	11.0
NY	11	$25,560,000	$10,460,000	316.1	266.5	8.0	41.6
OR	4	$3,800,000	$3,800,000	122.0	0.0	6.0	116.0
PA	10	$27,292,000	$21,442,000	386.6	39.6	204.5	142.5
Total	**250**	**$475,188,683**	**$397,536,097**	**2,642.2**	**393.3**	**1,133.2**	**1,115.6**

*Maine and New Hampshire do not currently have clean energy funds. The projects located in these two states have received support from Massachusetts' clean energy fund. Similarly, one wind project located in Massachusetts has received financial support from Rhode Island's renewable energy fund.

2. California has been the biggest player historically, but other states have been more active recently.

Among the states listed in Table 1, California clearly dominates, accounting for roughly half of total dollars obligated, as well as capacity obligated and online. This not only reflects the sheer size of California's renewable energy program, but also its early initiative: California's first auction of production incentives to utility-scale renewable energy projects occurred in June 1998, roughly two years prior to similar activity in other states. By the same token, however, California has not encumbered new funding for such projects since 2001,[3] and has also experienced difficulty in bringing funded projects online – 66% of all pending capacity is in California. Meanwhile, much of the activity in other states has been more recent.

[3] This lapse is due in large part to the creation of the California RPS, under which the role of California's program that formerly targeted new utility-scale projects has changed to providing supplemental energy payments (SEPs) intended to cover the above-market cost of RPS contracts. Though no RPS contracts approved to date have required SEPs, such support would not be included in our database regardless, since it is RPS-related.

3. The amount of renewable generating capacity supported by state funds continues to increase, though the growth rate has slowed markedly.

As shown in Figure 2, with the exception of 1999 and 2004, the amount of renewable generating capacity being supported by these eight states has risen each year. Likewise, the amount of obligated capacity that has come online has also risen, with proportionally larger increases in 2001, 2003, and 2005 – all years in which the federal production tax credit (PTC) for wind power was scheduled to expire, thereby encouraging completion of wind projects prior to year's end (see Figure 3 for a clearer, wind-specific view of this phenomenon). Even so, the rapid growth in new obligated capacity in the early years has slowed markedly since 2003, perhaps partly in response to the slower-than-expected pace of development among projects already obligated funding. The transition of California and New York towards supporting such projects through RPS policies has no doubt also played a role in slowing the growth of new obligated capacity.

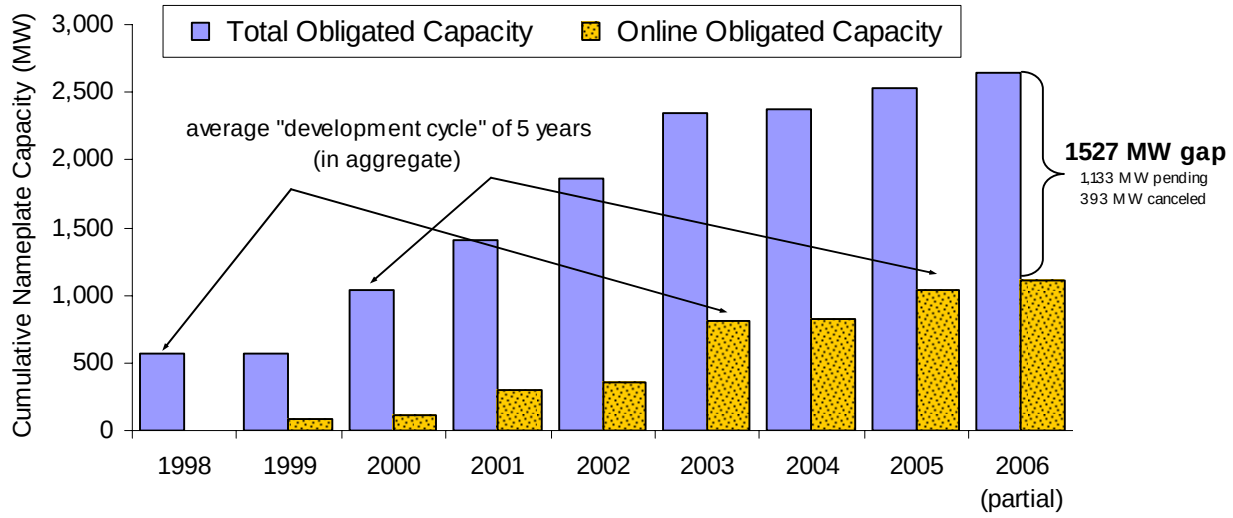

Figure 2. Cumulative Renewable Capacity Obligated and Online Over Time

4. Development difficulties have been encountered.

It is apparent from Figure 2 that the amount of obligated capacity coming online has not kept pace with the amount of new capacity being obligated funds: the gap between the two currently stands at 1,527 MW, a level that has remained more or less constant since 2002 (again, as shown in Table 1, 393 MW of this amount has been canceled or withdrawn, leaving 1,133 MW still pending). This is partly a reflection of unforeseen difficulties in the development process, such as permitting challenges, difficulty securing a power purchase agreement,[4] and the failure of Congress to extend the PTC in a timely manner (in 2004). On an aggregate basis, the length of the "development cycle" (i.e., the amount of time before a given amount of obligated capacity actually comes online) has, to date, been about 5 years on average – no doubt longer than most would have anticipated back in 1998.

5. Wind energy is a major recipient of financial support.

Having captured more than 60% of total funding to utility-scale renewable projects, wind power accounts for more than 80% of all obligated, online, and pending capacity. As shown in Table 2, 970 MW of obligated wind capacity is now online, and more than 900 MW are still pending (of the 330 MW of wind projects that have had their incentives canceled, 267 MW are in New York – see footnote 2 for an explanation). This high concentration reflects the cost-effectiveness and widespread availability of wind power. The next largest resource (in terms of funding and capacity) is geothermal, which has been supported by a single state – California. Landfill gas projects have also been somewhat successful at securing state incentives, though a relatively high number of such projects have since been canceled.

Figure 3 shows the cumulative amount of obligated capacity that has come online over time, by resource type.

[4] The lack of power purchase agreements is a key reason why both California and New York have moved towards an RPS structure that relies upon state renewable energy funds.

Table 2. Support for Utility-Scale Renewable Projects, by Resource Type (as of March 2006)

Resource Type	# of Projects	Obligated Funding ($)		Capacity (MW)			
		Original	Current	Original	Canceled	Pending	Online
Biomass	9	$20,347,840	$16,407,902	98.7	9.5	77.9	11.3
Digester Gas	3	$4,108,210	$4,108,210	6.0	0.0	6.0	0.0
Geothermal	4	$80,331,618	$80,331,618	156.9	0.0	97.9	59.0
Hydro	8	$14,946,409	$13,757,139	50.8	0.0	18.5	32.3
Landfill Gas	30	$41,974,893	$33,689,649	91.7	23.7	24.6	43.4
Waste Tire	1	$7,232,413	$0	30.0	30.0	0.0	0.0
Wind	195	$306,247,300	$249,241,580	2,208.2	330.1	908.4	969.7
Total	**250**	**$475,188,683**	**$397,536,097**	**2,642.2**	**393.3**	**1,133.2**	**1,115.6**

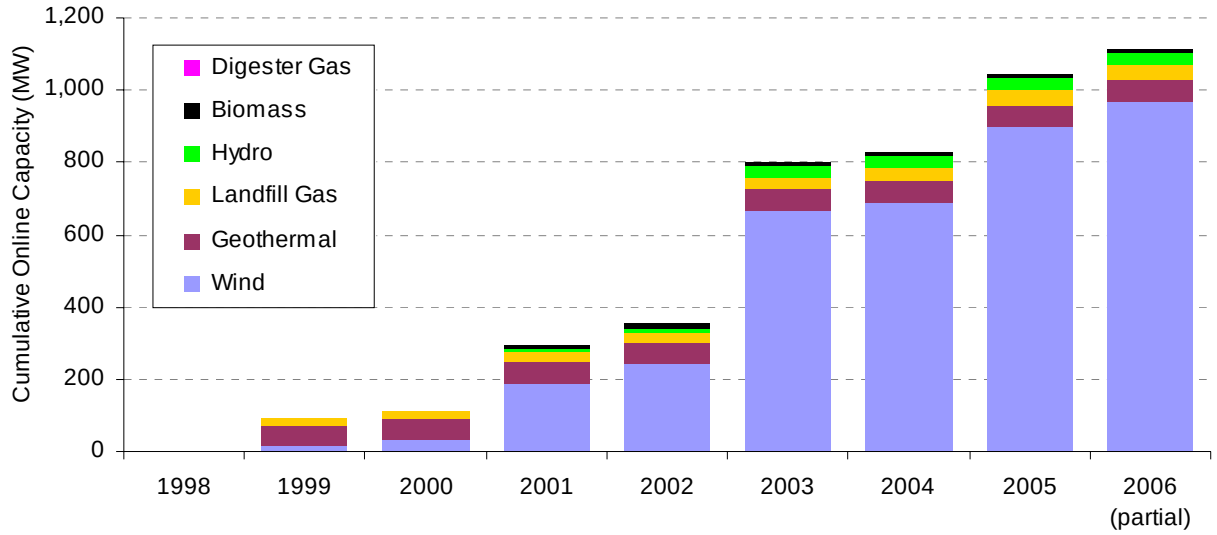

Figure 3. Cumulative Online Capacity Supported by CESA-Members, by Renewable Resource

6. States are increasingly using new and innovative incentive structures to support projects.

The structure of state clean energy fund support for utility-scale renewable energy projects has evolved somewhat over time. In the late 1990s, production incentives and grants were the predominant form of support. While both are still regularly employed,[5] a number of states have begun to expand their offerings to include debt financing, negotiated purchases of a project's tradable renewable certificates (TRCs), and "insurance" products that mitigate the project's price risk in the absence of a long-term power purchase agreement.

Figure 4 shows the prevalence of each type of incentive employed, based on percentage of total dollars obligated. As shown, real-time production incentives – utilized in California, Minnesota, New Jersey, New York, and Pennsylvania – account for 78% of all dollars obligated. Another 4% involves a variation on

[5] States are becoming increasingly innovative in their use of grants and production incentives. For example, some states have provided up-front, lump-sum, production incentives that are earned over time and secured by a letter of credit. Such an incentive provides similar value to the project as an up-front grant, without negatively impacting the project's ability to capture the federal production tax credit.

real-time production incentives, where instead of metering out funding over time, funding is provided up-front in a lump sum, but *earned* over time through electricity production or delivery of TRCs.[5] Pennsylvania, Oregon, and Illinois have each employed this type of incentive. Massachusetts and Rhode Island have offered various forms of TRC purchase and price insurance products, accounting for 8% of all dollars obligated. Meanwhile, Pennsylvania and New Jersey have provided debt financing equal to about 3% of all dollars obligated. Finally, grants in Illinois, Minnesota, New Jersey, New York, and Pennsylvania make up the remaining 7% of dollars obligated.

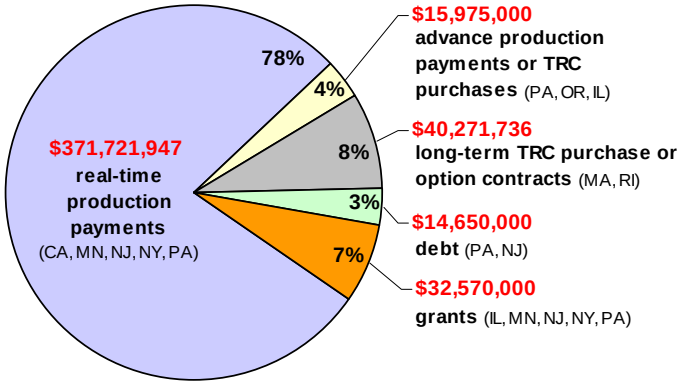

Figure 4. Percentage of Obligated Dollars Awarded Through Various Incentive Types

7. Support is predominantly production-based, rewarding electricity generation rather than project construction.

In aggregate, incentives that are based on actual production make up 90% of all dollars obligated (i.e., 78% real-time production payments plus 4% advance production payments or TRC purchases plus 8% TRC price insurance or ongoing TRC purchase commitments). More so than grants, such production-based incentives align the interests of project developers, state funds, and society in building or supporting projects that efficiently produce the maximum amount of clean, renewable energy. Just as importantly, unlike grants, production-based incentives are unlikely to trigger the anti-double-dipping provisions of the federal production tax credit (PTC) for renewable energy contained in Section 45 of the US tax code. How different incentive types interact with the PTC is an important consideration, given the PTC's potential value to a project.

8. Normalized incentive levels vary based on a number of factors.

Figure 5 shows the normalized (to 5-year production incentive equivalent) range of state clean energy fund support for each renewable resource. Incentive levels have ranged widely, particularly for wind, hydro, and biomass projects. In each of those cases, however, the capacity-weighted average normalized incentive falls close to the low end of the range, implying that there is not much capacity at the high end of the range. Typically, the high end of the range represents very small projects that have been able to secure generous incentives, perhaps justified by the disproportional impact of transaction costs and diseconomies of scale that small projects must sometimes overcome.

Although sample size (in terms of both number of projects and capacity involved) varies widely across resources, the ranking of resources based on capacity-weighted average normalized incentive level is not too surprising. Specifically, biomass and wind projects have required some of the lowest incentives on average, while digester gas projects have typically required more support (though the range of average incentives among resources is fairly tight overall, from $7-21/MWh on a 5-year equivalent basis).

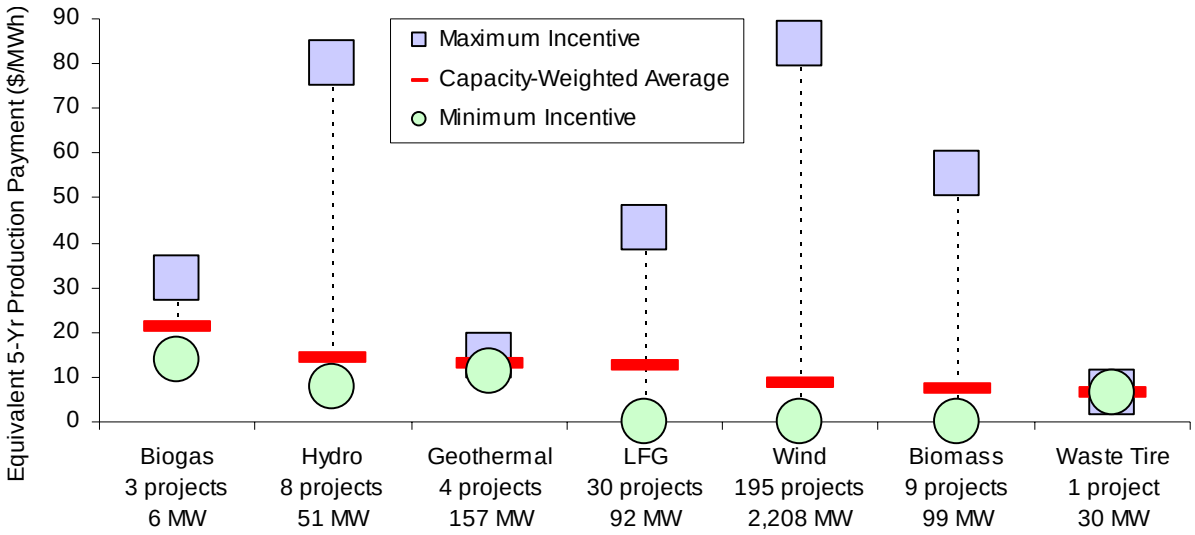

Figure 5. Equivalent 5-Year Production Incentives by Resource Type

Conclusions

To date, CESA-member state clean energy funds have committed a substantial amount of funding in support of utility-scale (> 1 MW) renewable energy projects. This funding, currently about $400 million, is already supporting 1,116 MW of new renewable capacity, and could eventually support up to 2,249 MW (i.e., 1,133 MW of obligated capacity still remains in the development pipeline). California has by far provided the most support of any fund (though not since 2001), while wind has by far received the most support of any renewable resource. Other state funds, however, are also supporting such projects (in some cases at similarly aggressive levels as California relative to the total size of endowment), and other renewable resources are also garnering attention and funding. Progress in obligating funds for new projects, and in bringing previously obligated projects online, has been fairly steady over time, though undoubtedly slower than originally envisioned with respect to development and construction. State funds are experimenting with increasingly innovative financial incentives, ranging from production incentives provided in an up-front lump sum and then earned over time, to various forms of debt financing, to options and other forms of price insurance on a project's TRCs. Finally, while the amount of financial support provided to individual projects has varied widely, on average the level of incentive provided to projects to date does not appear to be unreasonable.

The database from which this information has been compiled is publicly available at http://eetd.lbl.gov/ea/ems/cases/Large_Renewables_Database.xls, and will be updated periodically as new funding is obligated and new projects come online.

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Database of Utility-Scale Renewable Energy Projects Supported by CESA Members: http://eetd.lbl.gov/ea/ems/cases/Large_Renewables_Database.xls

ABOUT THIS CASE STUDY SERIES

A number of U.S. states have 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 States Alliance. 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 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. To access or download all the case studies, see: http://eetd.lbl.gov/ea/ems/cases/ or http://www.cleanenergystates.org/

ABOUT THE CLEAN ENERGY STATES ALLIANCE

The Clean Energy States Alliance (CESA) is a non-profit initiative funded by members and foundations to support the state clean energy funds. CESA collects and disseminates information and analysis, conducts original research, and helps to coordinate activities of the state funds. The main purpose of CESA 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 CESA, while Berkeley Lab provides CESA with analytic support.

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