

**Clean Renewable Energy Bonds Program  
2012 Annual Report  
March 2012**

**EXECUTIVE SUMMARY**

**Introduction**

California Streets and Highway Codes section 157.8 requires the California Department of Transportation (Department) to annually report to the budget committees of each house of the Legislature with regard to the issuance of Clean Renewable Energy Bonds (CREBs) for financing the acquisition and installation of photovoltaic (solar) energy systems until maturity of the bonds.

The 2012 CREBs Annual Report includes the following information:

- The status of each facility on which the Department has installed photovoltaic energy systems as part of the CREBs Program. (Exhibit 1)
- An accounting of the costs for each photovoltaic energy system installed or acquired by the Department. (Exhibit 1)
- A description of the energy savings the Department has achieved by acquiring or installing photovoltaic energy systems. (Exhibit 3)
- A review and analysis of the expected cost savings at the time of issuance of the bonds (Exhibit 2) versus actual annual savings. (Exhibit 3)

**Background**

The CREBs Program was authorized as part of the Tax Incentives Act of 1995, which was passed by the United States Congress to encourage energy conservation, develop energy infrastructure, increase domestic energy production, and the use of alternative energy sources.

The CREBs Program is administered by the United States Internal Revenue Service (IRS). CREBs are a type of tax credit bond in which interest on the bonds is paid in the form of tax credits by the United States government. The proceeds for the issuance of the CREBs are available to finance renewable energy and clean coal facilities projects.

On November 13, 2006, the IRS approved 93 CREBs applications submitted by the Department, with a total value of \$45.6 million. The Department subsequently initiated efforts to re-evaluate and approve facilities for conceptual soundness and adjusted the scope as necessary at each facility. The re-evaluation criteria consisted of the age and condition of the roof and design; the long-term building retention; structural integrity; and a cost-benefit analysis. Through this process, the number of photovoltaic projects was reduced to 70, with construction and installation costs estimated at \$19.9 million.

A Banc of America Bond sale for capital outlay costs was obligated for a total of \$20 million, plus interest of \$2.2 million (1.45% rate) over a 15-year period.

## **CREBs PROGRAM**

### **Overview**

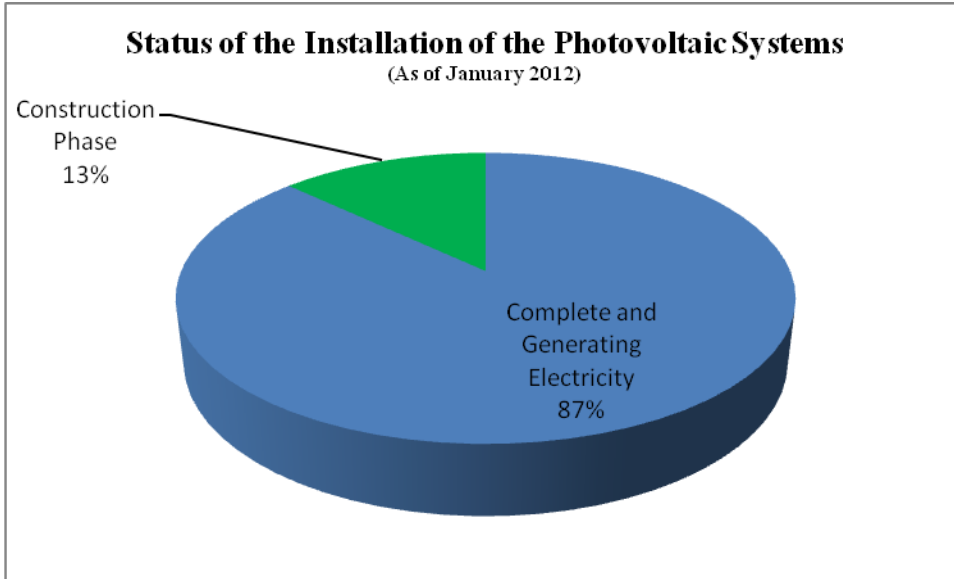
The Department is installing photovoltaic energy systems on 70 building sites throughout the state under the CREBs Program. The goal is to generate over 2.4 megawatts (MW) of photovoltaic capacity (Exhibit 1). The photovoltaic panels have a life expectancy of at least 25 years. The installation of the photovoltaic energy systems will help the Department meet energy conservation goals outlined in Former Governor Arnold Schwarzenegger's Executive Order (EO) S-20-04 dated December 14, 2004. This order targets a 20 percent reduction in grid-based energy savings for state-owned buildings by 2015.

A listing of the Department's 70 photovoltaic installation projects at various transportation facilities, as well as the installation dates, is presented in Exhibit 1. The following table displays the total number of photovoltaic energy system projects by facility type.

<b>Facility Type</b>	<b>Number of Projects</b>
Maintenance Facilities	46
Equipment Shops	9
Safety Roadside Rest Areas	3
Office Buildings	4
Materials Laboratories	2
Transportation Management Centers	2
Toll Bridge Facilities	2
Truck Inspection Facilities	2
<b>TOTAL</b>	<b>70</b>

### **Status of Projects**

A summary chart of the status of the installation of the photovoltaic energy systems is displayed on the next page. As of January 2012, there were 61 of the 70 projects (87%) complete and generating electricity. It is anticipated that all 70 projects will be completed and generating electricity by June 2012.



## **BUDGET**

### **Original Cost Benefit Analysis**

The Department examined the cost effectiveness and viability of each project. Financial factors considered for each project included energy consumption and the average cost of the utility-provided electricity for the facility. This data was compared with industry averages for the cost to install roof-mounted photovoltaic energy systems for the required kilowatts of electricity at each facility. As a result, the Department estimated a utility savings of approximately \$24.7 million over 15 years with a bond debt service payment of \$22.8 million (Exhibit 2).

### **Revised Cost Benefit Analysis**

Because many of the sites generating power just recently became operational, sufficient data of the actual energy generated to accurately calculate the annual avoided cost of energy is not available at this time. Therefore, the cost benefit analysis was prepared utilizing a projection of the energy to be generated in order to estimate the annual avoided cost of energy. It has been found that the actual energy production and cost avoidance are consistent with predicted values for those sites which have been generating energy for over a year.

In the revised cost benefit analysis, the annual avoided cost of energy was changed to reflect the guidelines and assumptions presented by the California Energy Commission (Commission) in the photovoltaic installation guidelines titled, "A Guide to Photovoltaic System Design and Installation," dated June 2001. In addition, the Department elected to design, bid, and manage the CREBs projects, which reduced the bond debt service by approximately \$9.8 million to \$13 million. The Department's personnel cost to support the CREBs Program is projected to be

approximately \$4.0 million. As a result, the Department estimates a utility savings of approximately \$10.1 million over the 15 years with a bond debt service of \$13.0 million (Exhibit 3). Because the actual construction cost is lower than projected, the CREBs' principal will be partially prepaid from unused bond proceeds on June 10, 2014, which is a schedule prescribed in the CREBs Bond Indenture and the Equipment Sublease, Section E.

### **Comparison of the Original Cost Benefit Analysis and the Revised Cost Benefit Analysis**

Due to the Department's limited experience with photovoltaic energy systems, the original cost benefit analysis did not account for all factors that affect the output of a photovoltaic energy system and economic benefits under variable weather conditions over time. Because the intensity of light on a surface varies throughout a day, as well as day to day, the actual output of a photovoltaic energy system can vary substantially. Therefore, to obtain a more realistic expectation of the overall system output and economic benefits, calculations were adjusted in the revised cost benefit analysis utilizing the guidelines provided by the Commission, which consider factors such as standard test conditions, dirt and dust, temperature, sun angle, and building orientation.

The original Cost Benefit Analysis Annual Avoided Cost calculation was based on an average of eight hours of sunlight each day. Following the guidelines of the Commission report, the average time of sunlight each day was revised to approximately five hours each day.

Taking into account the various factors that the Commission has identified as affecting the output of a photovoltaic energy system and the delays to the original CREBs project delivery schedule, the following assumptions identified in the original cost benefit analysis have changed:

- The total annual avoided cost changed from \$24.7 million to \$10.1 million over a 15-year period,
- The total bond debt service of \$22.8 million was reduced to \$13.0 million, and
- It will take an additional nine years to fund the bond debt service and cost associated with the photovoltaic systems (12 years revised to 21 years).

### **CONCLUSION**

The CREBs Program was established to increase the Department's efforts towards grid-based energy conservation as outlined in EO S-20-04. This was to be accomplished by installing photovoltaic energy systems on Department-owned facilities at a cost of \$20 million and financed through a 1.45% interest CREBs. It was the Department's anticipation that the CREBs Program would begin generating electricity one year after the sale of the bonds and that the bond debt service be fully paid through avoided energy cost before the maturity of the bond.

Although the Department has not met the original projected cost saving of the CREBs Program, after 25 years the bond debt and costs associated with the photovoltaic projects will be paid off. For the life of the system, it is projected that the Department will save \$5.5 million (Exhibit 3). The photovoltaic projects increased the departmental efforts towards energy conservation as

outlined in EO S-20-04 and support the state’s renewable power statutes, “green power,” electric grid demand, energy conservation, Leadership in Energy and Environmental Design (LEED), and climate change mandates.

As Governor Edmund G. Brown Jr. stated when signing SBX1-2 in April 2011, “while reaching a 33 percent renewables portfolio standard will be an important milestone, it is really just a starting point – a floor, not a ceiling.” He continued in the message to say, “our state has enormous renewable resource potential. I would like to see us pursue even more far-reaching targets.” The Department’s CREBs Program supports the Governor’s goal of stimulating investments in green technology, creating new jobs, and promoting energy independence. The 2.4 megawatts of solar power that the Department’s 70 sites are expected to produce can power approximately 500 homes per year.

## **APPENDIX**

### **Exhibit**

- 1 California Department of Transportation Clean Renewable Energy Bonds Projects
- 2 CREBs 15-Year Bond Term (Original Cost Benefit Analysis)
- 3 CREBs 15-Year Bond Term (Revised Cost Benefit Analysis)