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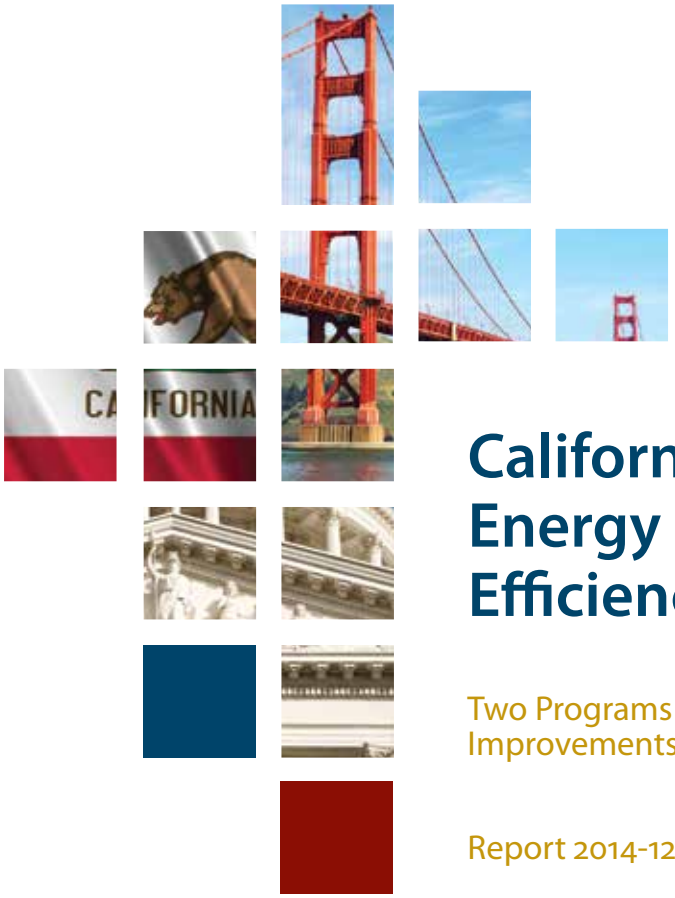

California's Alternative Energy and Efficiency Initiatives

Two Programs Are Meeting Some Goals, but Several Improvements Are Needed

Report 2014-124

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California State Auditor

Elaine M. Howle State Auditor
Doug Cordiner Chief Deputy

February 10, 2015 2014-124

The Governor of California
President pro Tempore of the Senate
Speaker of the Assembly
State Capitol
Sacramento, California 95814

Dear Governor and Legislative Leaders:

As requested by the Joint Legislative Audit Committee, the California State Auditor presents this audit report on two of the State's alternative energy and efficiency initiatives—the California Solar Initiative (solar initiative) and the Clean Air Vehicle Decal Program (decal program). Specifically, we were asked to evaluate the extent to which the goals of these programs are being achieved and who is benefitting the most from them.

This report concludes that the solar initiative, overseen by the California Public Utilities Commission (commission), will likely install enough solar energy systems to reach its 2016 goal of 1,940 megawatts of installed solar capacity, but other goals remain uncertain or inadequately quantified. For example, one goal is that the solar initiative should lead to pollution reduction benefits. Although a 2010 consultant's study concluded the solar initiative reduced smog-related emissions, it did not put those reductions in the context of the State's overall emissions, nor did it show how those reductions have resulted in measurable benefits to the State. Furthermore, some solar initiative programs need further evaluation. For example, the commission established a Research, Development, Deployment and Demonstration Program (research program). Although the research program is nearly complete, the commission still has not selected a program evaluator to assess whether this program has contributed to solar initiative goals. Finally, the California Solar Initiative Thermal Program will not install enough solar water-heating systems to meet its goal by the time the program ends in 2017.

The goal of the decal program—administered by the California Air Resources Board (Air Resources Board), the California Department of Motor Vehicles (Motor Vehicles), the California Department of Transportation, and the California Highway Patrol—is to encourage Californians to drive clean air vehicles by allowing certain low-emission vehicles to travel in carpool lanes with just one occupant. Although we found that the participation in the decal program continues to grow, the Air Resources Board needs to measure the decal program's effect on air quality, and Motor Vehicles needs to conduct periodic cost analyses to ensure that decal fees cover all program costs.

Finally, although both programs track geographic information on participants, neither collects demographic data. Specific to the solar initiative, we found participation to be dispersed geographically throughout the State; however, the limited demographic data that exists shows that participants in the solar initiative tend to be older, wealthier, and have received more education than most Californians. As expected, participants in the decal program largely reside in the counties that have freeways with carpool lanes, such as Los Angeles and Santa Clara. With respect to the decal program, a recent consumer survey for a related incentive program for clean air vehicles found that although the ages of respondents are somewhat evenly distributed, most respondents were male and earned $100,000 or more per year.

Respectfully submitted,

Elaine M. Howle

ELAINE M. HOWLE, CPA
State Auditor

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Contents

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Summary

Results in Brief

In 2006 Senate Bill 1—enacted as Chapter 132, Statutes of 2006—established requirements for the California Solar Initiative (solar initiative) as part of a larger statewide effort to support the installation of solar energy systems that generate solar electricity. Some years earlier, the Legislature had also established the Clean Air Vehicle Decal Program (decal program) to encourage Californians to drive clean air vehicles by allowing certain low-emission vehicles to travel in carpool lanes with just one occupant. Our review of studies examining the successes and shortcomings of both programs and our own analyses of available data show that the programs have met some of their goals. Nevertheless, the California Public Utilities Commission (commission) needs to better monitor and quantify the progress toward some solar initiative goals, such as the program's efforts to create benefits related to reductions in smog-related emissions throughout the State. Likewise, the California Air Resources Board (Air Resources Board) needs to study the decal program's effect on air quality, and the California Department of Motor Vehicles (Motor Vehicles) needs to conduct cost analyses to make certain that decal fees cover all program costs.

The goals of the solar initiative, which encompasses five programs, are to encourage the installation of solar energy systems on residential and nonresidential buildings that will reach a capacity of 1,940 megawatts and to help create a self-sufficient solar industry by 2016. The commission oversees the solar initiative, but six program administrators administer it within the service areas of four investor-owned utilities. Customers of these utilities fund the $2.617 billion incentive program through a surcharge on ratepayers' bills. Because utility customers fund the solar initiative, costs to the State are minimal. The solar initiative's five programs are the General Market Program, which serves residential and nonresidential utility customers; the Single-Family Affordable Solar Homes Program; the Multifamily Affordable Solar Housing Program; the Research, Development, Deployment and Demonstration Program (research program); and the California Solar Initiative Thermal Program (thermal program), which provides incentives for installing solar water-heating systems.

As of September 2014 the solar initiative's three programs, which are aimed at increasing the installation of solar energy systems, had 1,844 megawatts of installed or pending solar capacity, leaving only 96 megawatts to be installed by December 2016 to meet the commission's goal. For the $50 million research program, which provides funding for projects to support the solar initiative

Audit Highlights . . .

Our review of two alternative energy and efficiency initiatives—the California Solar Initiative (solar initiative) and the Clean Air Vehicle Decal Program (decal program) revealed the following:

- *The California Public Utilities Commission (commission) will likely meet the megawatt and self-sufficiency goals of the solar initiative.*
- *The commission needs to better monitor and quantify the progress toward some solar initiative goals.*
  - *It has not selected a program evaluator to assess whether the Research, Development, Deployment and Demonstration Program contributed to the solar initiative's goals.*
  - *It will not meet the goals for the California Solar Initiative Thermal Program due to low participation.*
- *The California Department of Motor Vehicles' current decal fees are insufficient to cover all program costs.*
- *The California Air Resources Board needs to measure the decal program's effect on air quality.*
- *Both the solar initiative and the decal program have generally served Californians with higher incomes.*

in achieving its megawatt goal, the commission established a process for awarding and monitoring grants. However, with the research program nearly complete, the commission still has not selected a program evaluator to assess whether this program has contributed to the solar initiative's goals, as the program plan that the commission adopted specified. As for the solar initiative's thermal program, the commission found that it will not accomplish any of its goals due to low participation, which it attributes to falling natural gas prices and the high installation costs for solar water-heating systems.

Concurrent with the 1,940-megawatt installation goal, the solar initiative also aims to create a self-sufficient market for solar energy in which solar energy systems will be a viable source of electricity for residential and nonresidential utility customers by 2016. A 2014 consultant's study addressing the state of the solar industry determined that the solar initiative has helped overcome market barriers to the adoption of solar energy systems in California. Moreover, the study found evidence that the California solar industry would be sustainable in the absence of solar initiative incentives, although future legislative and regulatory rulings could put that sustainability at risk.

Finally, Californians' participation in the solar initiative should also lead to pollution reduction benefits. A 2010 consultant's study of the solar initiative's impact on pollution concluded that for that same year, the solar initiative reduced smog-related emissions. Although reductions in pollution emissions are a benefit in and of themselves, the consultant's study does not put those reductions in the context of the State's overall emissions, nor does it show how those reductions have resulted in measurable benefits to the State, such as cleaner air or fewer health problems.

To provide incentives to increase the number of low-emission vehicles, California's decal program provides stickers to certain low-emission vehicles so that they can travel in carpool lanes with only one occupant. State law divides the responsibility for administering the program among Motor Vehicles, the Air Resources Board, the California Department of Transportation, and the California Highway Patrol. State law does not require any of these agencies to monitor the goals and objectives of the decal program and none perform such an analysis. However, in May 2014, the State reached the limit on the decals it can issue for one of the eligible vehicle types—plug-in hybrids—indicating that, in addition to these vehicles' gas savings, owners of these vehicles may also value the access to carpool lanes that these decals provide. Consequently, in 2014 the State increased the decal limit for plug-in hybrids from 40,000 vehicles to 70,000 vehicles. Further, Motor Vehicles charges an $8 fee that is intended to fully

fund its program costs. However, we determined that the current fee is insufficient and, based on current costs, should be increased to $15. We estimate that by raising the application fee to $15, Motor Vehicles would have collected an additional $336,000 in fiscal year 2013–14.

Further, a lack of comprehensive demographic data prevents us from concluding whether the solar initiative and the decal program have served a diverse population of Californians. However, the limited demographic data that does exist shows that participants in the solar initiative's General Market Program tend to be largely older, wealthier, and have received more education than most California homeowners. Given the high up-front costs of installing solar energy systems, it is not surprising that the demographic group participating in the solar initiative would fit this profile. Financing such an investment, even after taking advantage of the solar initiative incentive and federal tax credit, is probably difficult for those with lower-than-average incomes.

With respect to the decal program's capacity to appeal to a diverse population, a recent consumer survey for a related incentive program for low-emission vehicles found that, although the ages of respondents are somewhat evenly distributed, most respondents were male and earned $100,000 or more per year. Because vehicles that qualify for the decal program are generally more expensive than equivalent conventional models, we would expect decal program participants to earn a higher-than-average income.

Further, as expected, participants in the decal program largely reside in the counties that have freeways with carpool lanes, such as Los Angeles and Santa Clara. The Air Resources Board has not studied the effect, if any, of the decal program on air quality nor is it required to do so. However, our review of available data found that some of the counties with the highest concentration of decals tend to be in areas that have poor air quality and in areas that possess a significant number of carpool lanes.

Recommendations

The Solar Initiative

To make certain that the research program contributes to the goals of the solar initiative, the commission should conduct a program evaluation before the remaining grant projects are completed.

Because the thermal program has not been successful in meeting the goals outlined in state law, the Legislature should consider whether it wants to continue authorizing the collection of ratepayers' money to fund the program.

To show how air pollution emissions reductions related to the solar initiative benefit the State, the commission should include in future reports the measurable benefits of those reductions.

The Decal Program

To learn whether the decal program helps to reduce the State's air pollution, the Legislature should require the Air Resources Board to research whether there is a relationship between decal usage and a change in the State's air quality.

To ensure that the decal fee is sufficient to reimburse program costs, Motor Vehicles should periodically perform a full cost analysis of the decal program and update the fee accordingly.

Agency Comments

The commission and Motor Vehicles generally agreed with our conclusions and recommendations; however, the commission asserted it may have difficulty implementing our recommendation that it should include the measurable benefits of pollution reduction in future reports. We had no recommendations for the Air Resources Board and it did not to respond to our report.

Introduction

Background

In 1999 the Legislature declared that California's urban air quality was the worst of any state in the United States, with more than 80 percent of the population living in areas that do not meet federal or state air quality standards. In 2005 former Governor Schwarzenegger signed an executive order establishing greenhouse gas reduction targets, including a reduction of greenhouse gas emissions by 2050 to 80 percent below 1990 levels. Over the last several years the Legislature has enacted several incentive programs to help achieve the State's air quality and climate goals, such as the California Solar Initiative (solar initiative) and the Clean Air Vehicle Decal Program (decal program), which encourage the use of solar energy and the use of low-emission vehicles, respectively.

Senate Bill 1 (Chapter 132, Statutes of 2006) established three solar programs in an effort to encourage the use of solar electricity through the installation of solar energy systems on residential and nonresidential buildings. As Table 1 on the following page shows, the programs are known collectively as the Go Solar California campaign, whose goal is to create 3,000 megawatts of installed solar capacity by 2016. The text box provides some perspective on how this amount of solar-generated electricity could affect Californians. The largest of these three programs, targeted to customers of the State's largest investor-owned utilities, is the solar initiative. The California Public Utilities Commission (commission) oversees this $2.617 billion incentive program for California customers of four investor-owned utilities—Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), and Southern California Gas Company (SoCalGas). The solar initiative provides monetary incentives to encourage utility customers to install solar energy systems and solar water-heating technologies, which offset some or all of their electricity or natural gas demand. The main goal of the solar initiative is to encourage Californians to install solar energy systems capable of generating 1,940 megawatts of electricity for residential and nonresidential buildings—which include commercial, government, and nonprofit—by the end of 2016. Other goals of the solar initiative are for solar energy systems to be a cost-effective investment for participants, to improve the reliability of the State's system for transmitting and distributing electricity, and to create benefits related to pollution reduction.

Understanding Power Measurement

Kilowatt=1,000 watts
Megawatt=1,000,000 watts

For perspective:

- In 2012 a typical residential utility customer in the United States consumed an average of 903 kilowatt hours per month.
- A 5-kilowatt residential solar energy system generates an average of 750 kilowatt-hours per month.
- A megawatt-hour is roughly equivalent to the amount of electricity used by 330 homes during one hour.
- The California Solar Initiative's (solar initiative) goal is to reach 1,940 megawatts of installed solar capacity by 2016. In other words, if the necessary number of installed solar energy systems operate at their full capacity for one hour, they would generate 1,940 megawatt-hours of solar energy, or enough energy to power about 640,200 homes for one hour.

Sources: U.S. Energy Information Administration's Web site; Apex Solar Inc.'s Web site; the California Public Utilities Commission Decision D. 06-12-033; the *California Public Utilities Commission California Solar Initiative Program Handbook*, May 2014; and the California State Auditor's analysis of the solar initiative's solar capacity goal.

Table 1
Origin and Program Components of the California Solar Initiative

Components of the Go Solar California Program

PROGRAM COMPONENT	CALIFORNIA SOLAR INITIATIVE (SOLAR INITIATIVE)	PUBLICLY OWNED UTILITIES' SOLAR PROGRAMS	NEW SOLAR HOMES PARTNERSHIP
Program authority	California Public Utilities Commission (commission)	Publicly owned utilities	California Energy Commission
Budget ($3.8 billion)	$2.617 billion	$784 million	$400 million
Solar goals (3,000 megawatts)	1,940	700	360
Scope	All solar energy systems in investor-owned utility areas except new homes	All solar energy systems in publicly-owned utility areas	Solar energy systems on new homes in investor-owned utility areas

Solar Initiative

PROGRAM	PROGRAM ADMINISTRATOR	PURPOSE	GOAL	BUDGET (IN MILLIONS)‡
General Market	Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and the Center for Sustainable Energy (center)*	Provides incentives to residential and nonresidential ratepayers to install solar energy systems.	Install 1,940 megawatts of solar capacity.†	$2,098§
Single-Family Affordable Solar Homes	GRID Alternatives (nonprofit)	Provides highly or fully subsidized solar energy systems for single-family, low-income households.	Use at least 10 percent of the solar initiative budget for the installation of solar energy systems for low-income housing.	108
Multifamily Affordable Solar Housing	PG&E, SCE, and the center*	Provides incentives to multifamily low-income housing facilities for the installation of solar energy systems.		108
Research, Development, Deployment and Demonstration Program	Itron, Inc.	Provides grants to research, development, and demonstration projects that explore solar technologies.	Identify and support projects that will help the solar initiative achieve its megawatt and sustainability goals.	50
Thermal Program	PG&E, SCE, the center,* and the Southern California Gas Company	Provides incentives to single-family residential, multifamily or commercial, and low-income housing for the installation of gas-, electric-, or propane-displacing solar water heaters.	Displace 22.6 million therms of gas annually and displace 275.7 million kilowatts of electricity annually.	250
Total Budget				**$2,614‖**

Sources: Commission Decisions D. 06-12-033, D. 13-10-026, D. 08-10-036 and D. 10-01-022; Senate Bill 1 (Chapter 132, Statutes of 2006), Assembly Bill 1470 (Chapter 536, Statutes of 2007); Assembly Bill 2723 (Chapter 864, Statutes of 2006); Go Solar California's Web site; the commission's *California Solar Initiative Program Handbook*, May 2014; contract with Itron, Inc.; the commission's *California Solar Initiative Thermal Program Handbook*, September 2013; and the commission's *Review of the Incentive Levels and Progress of the California Solar Initiative-Thermal Program*, January 2014.

* The center is the program administrator in the San Diego Gas & Electric Company's service area.

† The commission did not adopt a specific megawatt goal for Single-Family Affordable Solar Homes or Multifamily Affordable Solar Housing programs; therefore, any megawatts installed under these two low-income programs are included as part of the General Market Program's 1,940-megawatt goal.

‡ The amounts listed under the heading *Budget (In Millions)* include the total funding for each solar initiative program. These amounts include funding set aside for specific uses such as incentives, program administration, marketing and outreach, measurement and evaluation, and research grants.

§ The General Market Program may allocate up to $100.8 million of its incentive budget to the California Solar Initiative Thermal Program (thermal program) to provide incentives for water-heating systems that displace electricity.

‖ The total budget amount excludes $2.6 million in funding for the Solar Water Heating Pilot Program, the precursor to the thermal program.

The solar initiative has five program components, as Table 1 shows. The General Market Program, which has the largest budget of all solar initiative programs, provides monetary incentives to encourage residential and nonresidential customers to install solar energy systems. Furthermore, subsequent legislation mandated that the commission set aside at least 10 percent of solar initiative funding for incentives to install solar energy systems on low-income residential housing. As Table 1 indicates, this legislation resulted in the commission developing the Single-Family Affordable Solar Homes Program (single-family program) and the Multifamily Affordable Solar Housing Program (multifamily program). Additionally, Senate Bill 1 set aside $50 million for the Research, Development, Deployment and Demonstration Program, which provides grants for solar technology projects that would assist the solar initiative in achieving its megawatt and sustainability goals. Finally, the Legislature created the California Solar Initiative Thermal Program (thermal program) to promote the installation of solar water-heating systems to reduce demand for natural gas, electricity, and propane.

In creating the solar initiative, the Legislature required the commission to establish *declining* dollar amounts of incentive levels. The purpose for declining incentives is that as the solar market grows, it is expected that solar installation costs will decline to the point where monetary incentives are no longer needed to encourage customers to install solar energy systems. State law requires the commission to reduce the dollar amount of the incentive levels by 7 percent annually over the duration of the solar initiative, and the incentive level must be zero by the end of the program in December 2016. To comply with this mandate, the commission created declining incentive levels for each customer sector—residential and nonresidential. Data from the commission shows that as of October 2014, the program administrators had exhausted nearly all available incentives. In fact, according to the commission, PG&E is no longer accepting any solar initiative applications for the General Market Program. While SCE and SDG&E are no longer accepting residential applications, they continue to accept nonresidential applications.

As Table 2 on the following page shows, the average size of a residential solar energy system installed under the solar initiative program is about 5 kilowatts, and it costs about $25,350 per residence to install, if purchased. At the October 2014 solar initiative incentive level of $200 per kilowatt, the participant receives an incentive of $1,000 to offset the installation cost. By taking the Federal Residential Renewable Energy tax credit, the participant may also claim on his or her federal income taxes up to 30 percent of the solar energy system installation costs less the solar initiative incentive, or about $7,305 for the average installation.

Therefore, we estimate that for a typical residential participant, the net cost of installing a solar energy system is approximately $17,045 as of October 2014.

Table 2
Understanding the Incentives for Installing Solar Energy Systems in California Residences

Cost of typical 5-kilowatt solar energy system for a California residence*	$25,350
California Solar Initiative (solar initiative) incentive *($200 per kilowatt)*†	1,000
Federal Residential Renewable Energy tax credit *(30% of total installation costs after solar initiative incentive)*	7,305
Net cost to solar initiative participant	**$17,045**

Sources: Go Solar California's Web site, the California State Auditor's analysis of unaudited data from the California Public Utilities Commission as of September 2014, and Title 26 of the Internal Revenue Code.

* As of the second quarter of 2014, the average completed costs for a residential, customer-owned solar energy system installation under the solar initiative was $5,070 per kilowatt. The average size of a solar energy system was approximately 5 kilowatts for residential installations under the solar initiative's General Market Program.

† The incentive level for the solar initiative was current as of October 2014.

Under the Commission's Oversight, Six Program Administrators Implement the Solar Initiative

As Table 1 outlines, the commission oversees the implementation of the solar initiative's five program components. Six program administrators—PG&E, SCE, Center for Sustainable Energy, GRID Alternatives, Itron Inc., and SoCalGas—administer the five programs. To fund the solar initiative, the commission established that four investor-owned utilities—PG&E, SCE, SDG&E, and SoCalGas—are responsible for collecting a portion of the budget based on their share of retail electric and gas sales. Customers of these four investor-owned utilities fund the solar initiative through a surcharge on their bills. However, low-income customers enrolled in ratepayer assistance programs through these investor-owned utilities are not required to pay the solar initiative surcharge.

The commission oversees the program administrators' implementation of the solar initiative. Commission staff perform a variety of activities in support of the solar initiative, such as establishing program rules and customer eligibility, developing evaluation plans, issuing requests for proposals, and selecting firms to conduct program evaluations. The commission also must submit to the Legislature an annual assessment of the solar initiative's success, which includes the program's overall costs and benefits, its environmental benefits, its impacts on the

electricity grid, any progress toward reaching each program's goals, and recommendations for improving the programs. The commission receives reimbursements from the four investor-owned utilities for its activities related to the oversight of the solar initiative. From 2007 through September 2014, the commission reported spending $5.4 million for these oversight activities. Because of this reimbursement and the fact that customers of investor-owned utilities fund the solar initiative, the commission states that there are no additional costs to the State.

The Solar Initiative Serves Residential and Nonresidential Participants Statewide

The solar initiative provides incentives for solar energy systems—ranging from 1 kilowatt to 1 megawatt in size—to eligible residential and nonresidential customers of PG&E, SDG&E, and SCE. As Table 3 indicates, from January 2007 to September 2014, residential participants installed about 143,000 solar energy systems, representing 96 percent of all installations. However, because residential homes tend to have smaller solar energy systems, these 143,000 installations account for only 41 percent of the megawatt capacity installed under the solar initiative. The remainder of the megawatt capacity, more than 59 percent, stems from installations by nonresidential participants—commercial, government, and nonprofit entities.

Table 3
Levels of Participation in the California Solar Initiative by Participant Type From January 2007 to September 2014

PARTICIPANT TYPE	SOLAR INSTALLATIONS	PERCENTAGE OF TOTAL SOLAR INSTALLATIONS	MEGAWATT CAPACITY OF SOLAR INSTALLATIONS	PERCENTAGE OF TOTAL MEGAWATT CAPACITY	TOTAL AMOUNT OF INCENTIVES RECEIVED (IN THOUSANDS)	PERCENTAGE OF TOTAL INCENTIVES
Residential	142,589	95.6%	749	40.6%	$660,874	33.4%
Nonresidential						
Commercial	3,654	2.4	522	28.3	588,274	29.7
Government	2,107	1.4	504	27.3	653,853	33.0
Nonprofit	869	0.6	69	3.8	76,107	3.9
Subtotals, Nonresidential	**6,630**	**4.4**	**1,095**	**59.4**	**1,318,234**	**66.6**
Totals	**149,219**	**100.0%**	**1,844**	**100.0%**	**$1,979,108**	**100.0%**

Source: California State Auditor's analysis of participation data from the California Public Utilities Commission as of September 2014. Data is unaudited.

Note: Table 3 includes data for all solar energy systems installed and pending installation from the General Market, Single-Family Affordable Solar Homes, and Multifamily Affordable Solar Housing programs.

In addition, data from the commission shows that the solar initiative issued or reserved incentives for more than 149,000 solar energy systems throughout the State, with many incentives concentrated in southern and central California. As Table A.1 beginning on page 39 in the Appendix shows, the top five counties based on the total amount of incentives are Los Angeles, San Diego, Riverside, Santa Clara, and San Bernardino. Predictably, many of California's most populated counties received the most incentives. Overall, participants reside in 53 out of the 56 counties that the three investor-owned utilities serve, illustrating the solar initiative's success in attracting participants throughout the State. The commission's data indicates that from January 2007 to September 2014, the solar initiative awarded approximately $1.023 billion in incentives under the General Market, single-family, and multifamily programs and reserved an additional $956 million for future incentive payments. Combined, the incentives total $1.979 billion and represent about 93 percent of these programs' $2.135 billion incentive budget. The solar initiative has approximately $156 million in available incentives to award as of September 2014.

For the thermal program, the commission's data shows that the solar initiative issued or reserved incentives for more than 2,400 solar water-heating installations throughout the State, with many incentives concentrated in central and southern California. As Table A.2 beginning on page 41 in the Appendix shows, the top five counties with participants receiving solar water-heating incentives are Los Angeles, San Diego, Alameda, San Francisco, and Riverside. Overall, the commission's data shows that the thermal program awarded approximately $24.4 million in incentives and reserved an additional $13.1 million for future incentive payments to program participants in 44 counties from May 2010 to September 2014. Combined, the incentives total $37.5 million and represent only 12.3 percent of the program's $305.8 million incentive budget. Thus, the thermal program has approximately $268.3 million in remaining solar water-heating incentives to award as of September 2014. Although the thermal program has spent only a small portion of its allocated budget, the commission requires that investor-owned utilities collect funds based upon actual annual expenditures from the prior year, which prevents the over collection of funds from ratepayers.

The Decal Program Encourages the Use of Low-Emission Vehicles

State law authorized the decal program, effective in 2000, to increase the use of low-emission vehicles at little or no cost to the State. The decal program grants carpool lane access to single-occupant vehicles that meet certain emission standards. Since the program's inception, the State has offered three different

decal designations that recipients must display on their vehicle to use carpool lanes. As Table 4 shows, in 2000 state law authorized access to carpool lanes to an unlimited number of inherently low-emission vehicles that do not use a traditional gasoline engine. In 2002 the California Department of Motor Vehicles (Motor Vehicles) issued regulations that assign a white decal to vehicles that meet these emission standards. As the Legislature expanded carpool lane access to qualifying hybrid vehicles that run on both conventional fuels and electricity, Motor Vehicles subsequently amended its regulations to assign these vehicles a yellow decal. The yellow decal program ended in July 2011. Effective January 2012 state law granted carpool lane access for a new classification of hybrid electric vehicles that can be charged by an outside power source. In October 2012 Motor Vehicles established a green decal for vehicles that meet this emission standard.

Table 4
Types of Decals Issued Under the Clean Air Vehicle Decal Program

DECAL PROGRAM	ELIGIBLE VEHICLE TYPES	LIMIT*	DECALS ISSUED*
White (07/2000–Current) 	100% battery electric, hydrogen fuel cell, and compressed natural gas. Examples of these vehicles include the Nissan Leaf and the Chevrolet Spark EV.	None	56,175
Yellow (01/2005–07/2011) 	Hybrid or alternative fuel vehicles. Examples of these vehicles include the Honda Civic Hybrid and the Toyota Prius.	85,000	85,000
Green (01/2012–Current) 	Plug-in hybrid vehicles. Examples of these vehicles include the Chevrolet Volt and the Ford Fusion Energi.	70,000	55,000

Sources: The California Air Resources Board's list of eligible vehicles, decal information obtained from the California Department of Motor Vehicles, and legislation authorizing the decal programs.

* The figures for the limit on the total number of decals and for the number of decals issued were current as of September 2014.

State law divides the responsibility for administering the decal program among the California Air Resources Board (Air Resources Board), Motor Vehicles, the California Department of Transportation (Caltrans), and the California Highway Patrol (Highway Patrol). Motor Vehicles is responsible for processing decal applications, which vehicle owners and dealerships submit along with an application fee designed to cover the program's actual costs. The Air Resources Board maintains a list of vehicle makes and models that qualify for the different decal programs, and Motor Vehicles uses that list to verify the eligibility of each applicant's vehicle. Federal law requires Caltrans to monitor federal performance requirements for carpool lanes, which involves

monitoring the vehicle speeds of carpool lanes and reporting that information to the U.S. Secretary of Transportation. Finally, Highway Patrol's role is to prevent the unauthorized use of carpool lanes by ineligible vehicles, such as single-occupant vehicles that do not display a decal.

Scope and Methodology

The Joint Legislative Audit Committee (audit committee) directed the California State Auditor to perform an audit to evaluate the solar initiative and the decal program. The audit analysis that the audit committee approved contains three separate objectives. Table 5 lists the objectives and the methods we used to address them.

Table 5
Audit Objectives and the Methods Used to Address Them

	AUDIT OBJECTIVE	METHOD
1	Review and evaluate the laws, rules, and regulations significant to the audit objectives.	Reviewed relevant laws, regulations, and other background materials applicable to the California Solar Initiative (solar initiative) and the Clean Air Vehicle Decal program (decal program).
2	For the most recent three-year period, for both the solar initiative and the decal program, determine the following: a. The extent to which the goals and objectives of the programs are being achieved. b. How much the programs have cost the State compared to the benefits derived. c. The geographic locations where expenditures or exemptions were provided and the locations where the benefits were received under the solar initiative. d. For the decal program, the geographic locations where the decals were issued and, to the extent possible, the demographic breakdown of the recipients by age, race, gender, and income level. e. Whether the incentives received through both programs were used equally across the State, in terms of geographic location and, to the extent possible, in terms of demographic characteristics.	Solar initiative • Interviewed California Public Utilities Commission (commission) staff and reviewed supporting documentation to determine if the solar initiative goals had been achieved. • Reviewed commission expenditure data for the costs for its oversight of the solar initiative and the amount of expenditures reimbursed to it. • Reviewed and summarized several consultants' studies regarding the goals and objectives of the solar initiative. • Identified the geographic locations of solar incentive recipients and used the solar installation database to summarize the amounts of incentives paid and pending by county. • Reviewed and summarized a 2012 commission study, which included a demographic survey on residential participants in the General Market Program and presented the survey's results on age, education, household income, and household occupancy. Decal program • Interviewed staff and reviewed supporting documentation to determine whether the California Department of Motor Vehicles (Motor Vehicles) or the California Air Resources Board (Air Resources Board) possesses data to demonstrate the effectiveness of the decal program. • Interviewed staff at Motor Vehicles and the Air Resources Board and reviewed supporting documentation to understand the costs and benefits of the program. We also interviewed staff at Motor Vehicles and reviewed documentation to determine if the decal fee is sufficient to reimburse program costs. • Identified the geographic locations of decal recipients using Motor Vehicle's decal database and summarized by county the number of decals issued. • Reviewed and summarized a 2014 Center for Sustainable Energy study, which conducted a survey of Californians who participated in the Clean Vehicle Rebate Program and presented results on age, education, household income, and household occupancy. • Reviewed observational data that the California Department of Transportation (Caltrans) collects to determine the percentage of decal vehicles using carpool lanes. • Reviewed Air Resources Board's air quality and emissions data to identify California air basins with the highest ozone pollution and oxides of nitrogen emissions from motor vehicles.

	AUDIT OBJECTIVE	METHOD
3	Review and assess any other issues that are significant to the audit.	Solar initiative We did not identify any other significant issues. Decal program Reviewed Caltrans' carpool lane degradation report to determine if Caltrans tracks whether or not the State meets the average lane speed requirement established in federal law.

Source: California State Auditor's analysis of Joint Legislative Audit Committee audit request number 2014-124, planning documents, and analysis of information and documentation identified in the table column titled *Method*.

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Audit Results

Although the California Public Utilities Commission Has Made Progress Toward Achieving Some Solar Initiative Goals, Other Goals Remain Uncertain or Inadequately Quantified

In creating the California Solar Initiative (solar initiative), Senate Bill 1—enacted as Chapter 132, Statutes of 2006—established the five goals shown in Table 6 on the following page. The California Public Utilities Commission (commission) will likely meet the megawatt and self-sufficiency goals of the solar initiative, but other goals remain only partially achieved, or not enough data exist to determine whether the commission has fulfilled those goals. For example, as of September 2014, the solar initiative had reached 95 percent of its megawatt goal, and the program still has nearly two years before it expires. However, other solar initiative goals have not been achieved. For instance, a 2011 consultant's study found that the solar energy systems have mostly been cost-effective for residential participants but not for nonresidential participants.[1] Likewise, although the commission is working to address deficiencies, it still does not have effective means for measuring the impacts of solar energy on the electricity grid. Finally, although a 2010 consultant's study points to pollution reductions due to the solar initiative, it does not show how, or if, those reductions have benefited the State in terms of cleaner air or improved health.[2]

The solar initiative will likely meet its goal to install 1,940 megawatts of solar capacity by the end of 2016, when the program will expire. Based on commission data, as of September 2014, the solar initiative has installed 1,573 megawatts of solar capacity, and 271 megawatts are pending installation—a total of 1,844 megawatts of solar capacity—for both residential and nonresidential participants. As Figure 1 on page 17 illustrates, except for a slight dip in 2013, the amount of megawatt capacity installed per year has increased every year since the program began in 2007 through September 2014, although the total for the latter year includes pending applications. If all 271 megawatts of solar capacity in pending applications are installed, the solar initiative would need to install 96 megawatts by the end of 2016 for its goal to be met. Using historic participation rates, we believe that the solar initiative will achieve its 1,940-megawatt capacity goal by its expiration in 2016.

1 Energy and Environmental Economics, Inc., *California Solar Initiative Cost-Effectiveness Evaluation*, April 2011.

2 Itron, Inc., *CPUC California Solar Initiative 2010 Impact Evaluation Final Report*, June 24, 2011.

Table 6
California Solar Initiative Goals and Their Statuses

GOALS*	STATUS
Primary	
Install solar energy systems with a generation capacity equivalent to 1,940 megawatts by 2016	**LIKELY WILL BE ACHIEVED.** We determined that the California Solar Initiative (solar initiative) will likely meet the megawatt goal by 2016.
Establish a self-sufficient solar industry	**ACHIEVED BUT TENTATIVE.** A 2014 consultant's study determined that the solar initiative drove significant progress toward overcoming the market barriers identified by the California Public Utilities Commission (commission). However, the solar industry's long-term sustainability may be at risk.
Secondary	
Allow participants to make cost-effective investments in solar energy systems	**PARTIALLY ACHIEVED.** A 2011 consultant's study determined that between 2008 and 2020 the solar initiative was and will be consistently cost-effective for residential participants; however, the solar initiative will not be consistently cost-effective for nonresidential participants until 2018.
Provide additional system reliability for the electricity grid	**UNKNOWN.** A 2013 consultant's study determined that, although impacts of solar energy systems on the electricity grid appear minimal, the commission and the utilities have not quantified those impacts adequately.
Contribute to pollution reduction benefits	**UNKNOWN.** Although a 2010 consultant's study documented pollution emission reductions, it did not tie these reductions to related benefits, such as cleaner air or fewer health problems.

Sources: California State Auditor's analysis of the commission's compliance with Senate Bill 1 (Chapter 132, Statutes of 2006) and the following reports prepared for the commission: Navigant Consulting, Inc., *California Solar Initiative Market Transformation Study (Task 2)*, March 27, 2014; Energy and Environmental Economics, Inc., *California Solar Initiative Cost-Effectiveness Evaluation*, April 2011; Black & Veatch Holding Company, *Biennial Report on Impacts of Distributed Generation*, May 2013; Itron, Inc., *CPUC California Solar Initiative 2010 Impact Evaluation Final Report*, June 24, 2011.

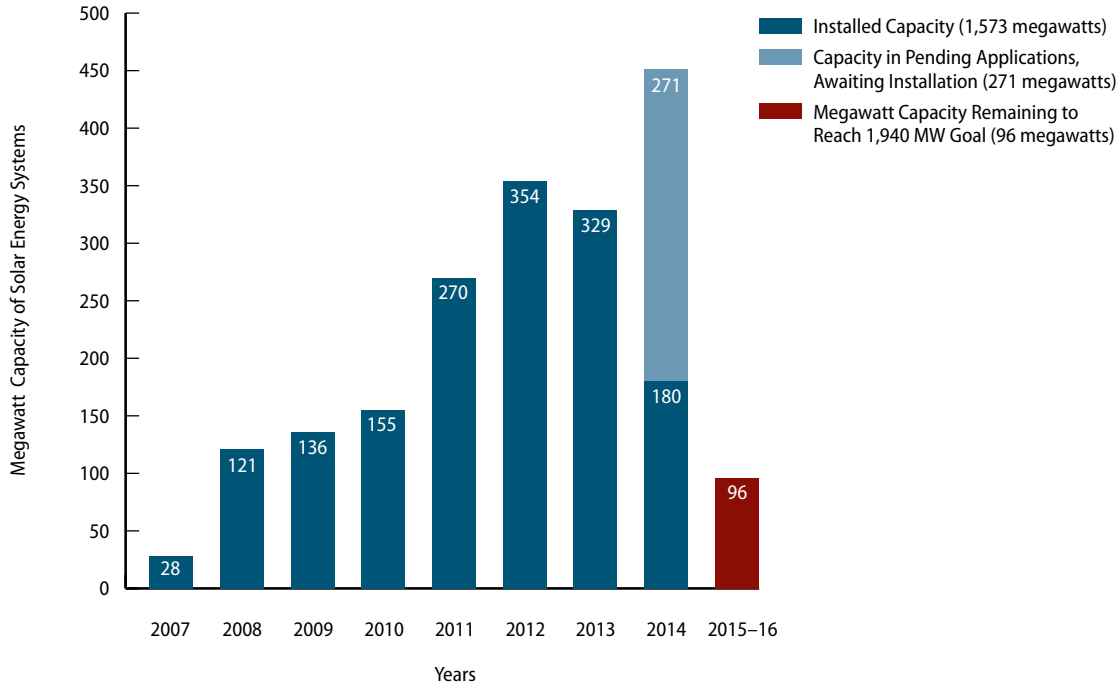
* The commission asserts that the first two goals are primary and the remaining three are secondary.

The Solar Initiative Is on Track to Fulfill Its Goal for Megawatt Capacity

Legislation passed following Senate Bill 1 required that at least 10 percent of solar initiative funding be used for the installation of solar energy systems on low-income residential housing. As a result of this legislation, the commission created the Single-Family Affordable Solar Homes Program (single-family program) and the Multifamily Affordable Solar Housing Program (multifamily program). The commission's decision to implement the solar initiative stated that the General Market Program was to cover 90 percent of the 1,940-megawatt goal, implying that the single-family and multifamily programs would provide the remaining 10 percent, or 190 megawatts. However, the commission explained that it did not establish specific megawatt goals for the single-family and multifamily programs because the monetary incentives for these programs are greater in value than the incentives for the General Market Program,

and as a result these programs would run out of funding before reaching 190 megawatts.[3] In fact, the single-family and multifamily programs have used almost 75 percent of their allocated funding, but have installed only 35 megawatts of capacity and have another 8 megawatts pending installation as of September 2014. With regard to the legislative mandate requiring the low-income programs to spend at least 10 percent of the solar initiative's funding, according to the commission's data, these two programs have spent $160.7 million, or 74 percent, of their combined solar initiative funding of $216.7 million as of June 2014. According to a commission analyst, the remaining incentives for the multifamily program have been completely reserved, and the expectation is that the same will be true of the single-family program.

Figure 1
The California Solar Initiative's Megawatt Capacity of Installed and Pending Solar Energy Systems 2007 to 2016



Sources: California State Auditor's analysis of unaudited data from the Go Solar California Web site and the California Public Utilities Commission's Decision D. 06-12-033.

Notes: Figure 1 includes data for all solar energy systems installed and pending installation from the General Market, Single-Family Affordable Solar Homes, and Multifamily Affordable Solar Housing programs.

As of September 2014, 271 megawatts of solar capacity had pending applications, which we anticipate will eventually become installed.

[3] For example, as of October 2014, the incentive in the General Market Program was 20 cents per watt while it ranged between $4.75 and $7 per watt for the single-family program and $1.90 and $2.80 per watt for the multifamily program.

A Commission Consultant Determined That the Solar Initiative Was Instrumental in Overcoming Market Barriers, but the Solar Industry May Not Remain Sustainable Should New Barriers Arise

A 2014 consultant's study concluded that from 2007 through 2012, the solar initiative helped overcome market barriers to solar energy system adoption.[4] To make this determination, the study looked at four expected outcomes—reduced costs to customers, increased customer confidence in solar equipment, an expanded supply chain, and an increase in overall market size—that needed to be evident to show that market barriers had been reduced. For example, in examining one of the four expected outcomes, the study found that the costs for both residential and nonresidential solar energy systems have declined from the inception of the program through 2012. Based on the commission's data, we calculated that the cost of an average solar energy system installation for a residential customer—a 5-kilowatt system—dropped from $56,000 in 2007 to about $25,000 in 2014. Similarly, the cost of an average solar energy system installation for a nonresidential customer—a 152-kilowatt system—dropped from $1.6 million to $645,000 during the same time period.

A commission consultant concluded that the California solar industry will remain sustainable without the solar initiative incentive.

Further, the consultant concluded that the California solar industry will remain sustainable without the solar initiative incentive. More specifically, it concluded that an increasing number of installations do not rely on solar initiative incentives, and as worldwide regulatory and market forces affecting the manufacture of solar energy systems have led to price declines, the supply chain has expanded to meet growing customer demand for solar energy systems. As explained in the Introduction, the solar initiative is designed so that monetary incentives decline annually in dollar value and reach zero by December 2016. Data provided by the commission show that the number of solar energy system installations increased through 2013 despite decreases in the solar initiative's incentives, which provides additional support that the consultant's conclusion is valid. Furthermore, the study explained that solar installers have expanded their physical operations in California to enable them to respond to growing market demand that spans the entire State.

However, according to the 2014 consultant's study, the solar industry may not remain sustainable should new barriers arise in the market. In particular, the study cites uncertainty surrounding the future of California's net energy metering policy and its impact on the electric rate structure. According to the commission, *net energy metering* is

[4] Navigant Consulting, Inc., *California Solar Initiative Market Transformation Study (Task 2)*, March 27, 2014.

a billing arrangement that allows customers to use solar generation to reduce their electricity bill. Further, according to the study, some net energy metering customers are able to generate enough electricity to reduce their bill payments close to zero, allowing these customers to avoid paying fixed costs for maintaining the electricity infrastructure. Although it states that net energy metering has been instrumental in helping to drive the demand for solar energy systems, the study explains that recent legislative and regulatory decisions related to net energy metering are creating significant concerns about the long-term viability of the solar market. According to this study, changes in the benefits that net energy metering offers could make solar energy systems less advantageous for consumers to install and for investors to finance, thus curbing participation in the solar initiative and threatening its sustainability. Specifically, 2013 legislation authorizes the commission to develop a program for solar energy system participants that will ensure continued growth in the use of solar energy systems while at the same time accounting for the systems' costs and benefits, which may include net energy metering.[5] The legislation also states that the commission may consider changes to the retail rate structure, which could affect compensation for participants in net energy metering because current rate structures benefit them. Nevertheless, the study concludes that a prompt decision by the commission about the future of changes to net energy metering will add stability to the market. According to a commission analyst, the commission is currently conducting an assessment of how changes to net energy metering—or the elimination of net energy metering—might affect the sustainability of the State's solar market. The commission expects to complete its assessment by April 2015.

Changes in the benefits that net energy metering offers could make solar energy systems less advantageous for consumers to install and for investors to finance, thus curbing participation in the solar initiative and threatening its sustainablility.

Installation of Solar Energy Systems Is Consistently Cost-Effective for Residential Participants but Will Not Be Cost-Effective for Nonresidential Participants Until 2018

A 2011 consultant's study assessed whether installing solar energy systems will be cost-effective to both residential and nonresidential participants starting in 2008 and each year thereafter until the solar initiative expires in 2016. The consultant also forecasted whether installing solar energy systems after the solar initiative incentives are no longer available to both residential and nonresidential participants will be cost-effective for each year between 2017 and 2020.[6] The consultant's analysis compared the relevant costs of solar energy systems' installation to their financial benefits, which include lowered electricity bills, solar initiative incentives, and tax credits.

[5] Assembly Bill 327 (Chapter 611, Statutes of 2013).

[6] The 2011 consultant's study does not address cost-effectiveness after 2020.

The consultant's study concluded that the benefits residential participants derived from installing solar energy systems have outweighed and will continue to outweigh the costs of installation for every year between 2008 and 2020. Additionally, the consultant forecasted that by the time the solar initiative expires in 2016, the decline in the costs to install a solar energy system, combined with increasing electricity rates, will continue to make the program cost-effective for many residential participants even in the absence of the solar initiative incentives and state and federal tax credits. The continued decrease in the costs to install a solar energy system is consistent with our determination that installation costs have decreased, which we based on the commission's data and described in an earlier section.

The installation of a solar energy system would be consistently cost-effective for nonresidential participants only after the solar initiative program expires, beginning in 2018 through 2020, according to a study by a commission consultant.

However, the same consultant's study found that the installation of a solar energy system would be consistently cost-effective for nonresidential participants only after the solar initiative program expires, beginning in 2018 through 2020. The consultant concluded that the difference in cost-effectiveness experienced by residential participants and nonresidential participants during the early years of the solar initiative program may have arisen largely from the difference in the monthly electricity savings experienced by the two different types of participants. Specifically, the rate structure is more favorable to a residential participant taking advantage of the solar initiative program than it is to a nonresidential participant. Additionally, although the federal tax credit for nonresidential participants is not completely expiring in 2016 as it is with residential participants—it is being reduced from 30 percent of the total cost of the solar energy system to 10 percent—the consultant concluded that this decrease in the tax credit will not significantly affect the cost-effectiveness of installing solar energy systems for nonresidential participants. In fact, the consultant concluded that after 2017, the key driver for the change in the cost-effectiveness of solar energy systems for nonresidential participants—as for residential participants—will be electricity rate increases and the continued decline in the cost of solar energy systems.

The Solar Initiative's Impacts on the State's Electricity Grid and Its Pollution-Reduction Benefits Are Not Quantified Adequately but Appear Minimal

A 2013 consultant's study determined that the utilities have not quantified adequately the impacts of distributed power generation systems on the electricity grid—including the increased solar power capacity that the solar initiative created.[7] The study defines

[7] Black & Veatch Holding Company, *Biennial Report on Impacts of Distributed Generation*, May 2013.

distributed power generation systems as noncentralized electricity power production facilities of less than 20 megawatts, which would include the installation of residential solar energy systems under the solar initiative. According to the consultant's study, although these distributed power generation systems could have a number of potential impacts on the electricity grid, these impacts have not been adequately quantified but are believed to be relatively low. The study concludes that several conditions could be responsible for the lack of observed impacts, including the fact that utilities do not have the appropriate tools to collect and evaluate systematically the data on problems or benefits attributable to these distributed power generation systems and that formal research and development are required to better understand the issues and benefits correlated to distributed power generation systems. As a result, neither the commission nor the utilities know with certainty how increases in the power associated with distributed power generation systems, including those installed under the solar initiative, will affect the State's electricity grid.

The consultant also pointed to a number of emerging technologies that may alleviate some of the negative impacts and barriers to greater deployment of distributed power generation systems. A commission analyst stated that these technologies are key to gathering data about the impacts of distributed power generation systems. In addition, the analyst indicated that although the Legislature and the commission have initiated some efforts to encourage the adoption of these technologies, they are costly and largely unproven, making it difficult for utilities to commit to the technologies' widespread adoption. Because of uncertainties surrounding grid impacts and available technologies, the commission plans to continue to monitor the impacts and include any updates in its consultant's next report to the Legislature, which is due in 2015.

Although the 2010 consultant's study determined that the solar initiative reduced pollution, the consultant did not attempt to link those reductions to specific benefits, such as cleaner air or fewer health problems.

Further, although the 2010 consultant's study mentioned earlier determined that the solar initiative reduced pollution, the consultant did not attempt to link those reductions to specific benefits, such as cleaner air or fewer health problems. Specifically, the consultant determined that in 2010 the solar initiative reduced by a total of nearly 56 tons the amount of two select emissions—particulate matter and oxides of nitrogen—linked to health problems and deteriorated air quality, respectively. The consultant based this conclusion on an estimate of the amount of pollutants that an electricity plant using natural gas would have emitted to generate an equivalent amount of electricity. Although reduced emissions are a benefit in and of themselves, the reductions cited in the 2010 study are small relative to the State's overall emissions of those two pollutants. For example, according to the California Air Resources Board (Air Resources Board), the State emitted

557,000 tons of particulate matter and 848,000 tons of oxides of nitrogen in 2010. Thus, the 56 tons of reduced emissions in 2010 represent a very small amount of the State's overall annual emissions of particulate matter and oxides of nitrogen. Moreover, according to the commission, the 2010 study does not provide any additional data showing how these reductions may have translated into other types of measurable benefits, such as evidence of reduced respiratory health illnesses or increased clean air days, which further contributes to the difficulty of determining the significance of the reductions.

Other Solar Initiative Programs Need Further Evaluation

The commission has awarded $33 million for research projects without evaluating whether the completed projects contributed to solar initiative goals.

The remaining solar initiative programs either have not received evaluations or have clearly not met expectations. Specifically, under the Research, Development, Deployment and Demonstration Program (research program), the commission has awarded $33 million for research projects without evaluating whether the completed projects contributed to solar initiative goals. The California Solar Initiative Thermal Program (thermal program), which aims to reduce natural gas, electricity, and propane usage by promoting the use of solar water-heating systems, has underperformed. As a result, the thermal program is unlikely to meet its goals by the program's end date in 2017, even if the commission implements additional changes to the program's design.

No Independent Evaluator Has Monitored the Research Program to Determine Whether It Contributes to the Solar Initiative

The commission has not yet assessed whether the $50 million research program has contributed to the solar initiative's goals. To comply with Senate Bill 1, the commission established a process for awarding and monitoring grants through the research program, which was intended to fund projects that would help the solar initiative achieve its goal of 1,940 megawatts of installed capacity. Additionally, the 2007 commission decision implementing the research program specified that both a program administrator and an evaluator be chosen to assist the commission with the administration and evaluation of the entire research program. The evaluation was to take place once every three years. According to the commission, although it selected a program administrator, Itron Inc. (Itron), it has not selected a program evaluator. The commission indicated that it will wait until a sizable portion of the grants are completed before using an independent evaluator to conduct an evaluation. According to the commission, as of January 2015, it had not issued a request for proposals or taken any other steps toward securing a program evaluator for the research program.

To determine whether the projects selected for research program funding have contributed to solar initiative goals, we evaluated a selection of completed projects and found that they generally supported these goals. According to Itron, through the solicitation process, the research program has awarded $33 million in grant funds to 36 projects. Of these projects, 13 are complete and one was cancelled. The commission has directed the remaining research program funding to administrative expenses, including the eventual hiring of a program evaluator. The entities awarded funding by Itron included the University of California, the federal government, and private entities. Our review of three completed research program projects found that they all addressed the goals of the solar initiative. Specifically, two of the projects resulted in tools and research meant to help utilities better integrate solar energy into the electricity grid, and the third created a software program that utilities can use to create programs encouraging the installation of solar energy systems on retrofitted homes. Although our review of these three projects suggests that the projects did support solar initiative goals, a more complete evaluation by a program evaluator would not only have been a good practice, but it may also have provided greater insight into how to improve the program while the commission was still awarding grant funds. By not evaluating the entire research program every three years as originally intended, the commission cannot ensure that the grants it has awarded are in fact assisting the commission to meet the goals of the solar initiative, nor can it make any necessary adjustments.

By not evaluating the entire research program every three years as originally intended, the commission cannot ensure that the grants it has awarded are in fact assisting the commission to meet the goals of the solar initiative, nor can it make any necessary adjustments.

In addition to the $33 million it awarded in grants, the commission, when it implemented the research program in 2007, awarded $10 million to help finance construction of the Helios Solar Energy Research Center (Helios center)—located in Berkeley—which is led by Lawrence Berkeley National Laboratory and University of California, Berkeley. The research performed at this facility will focus on developing breakthrough solutions to low-cost solar electricity generation. Although the $10 million award accounts for only about one-tenth of the Helios center's estimated $100 million to $140 million overall cost, it makes up one-fifth of the $50 million in total research program funds. Furthermore, although approved by the commission at a public hearing, the decision to support the Helios center bypassed the process that the commission itself established for the awarding of funds to research program projects. In its decision, the commission stated that the funding it provided to support the Helios center was consistent with its goals to allocate funds expeditiously. Furthermore, the commission stated that the Helios center was well positioned to start up research projects quickly and thereby help achieve the solar initiative's megawatt goal by 2016. However, the commission did not require that any specific research be undertaken. According to the Lawrence Berkeley National Laboratory, construction of the facility began

in August 2012, and the facility is scheduled to open by May 2015, eight months after the originally scheduled completion date and nearly eight years after the commission awarded the funding to the Helios center. Because the facility is not yet complete, we cannot determine whether research conducted there will be able to develop cost-effective solar energy technologies that contribute to solar initiative goals by the end of the program, as stated by the commission. Thus, the commission directed a large portion of the program's funding to a project whose impact is not likely to be known before the solar initiative largely ends in 2016.

Despite the Commission's Efforts, the Thermal Program Will Not Install Enough Solar Water-Heating Systems by Late 2017 to Meet Its Goals

Prices for natural gas have dropped significantly, but the installation costs for solar water-heating systems for single-family homes have not decreased. For these reasons, the commission's January 2014 report to the Legislature (2014 commission report) concludes that the thermal program will not install enough solar water-heating systems to reach either of its two goals. As the Introduction explains, the Legislature created the thermal program to promote the installation of solar water-heating systems, which reduce the demand for natural gas, electricity, or propane. The thermal program has two goals, each of which corresponds to the energy source of the solar water-heating system: The first goal is to achieve by the end of 2017 the installation of solar water-heating systems that displace 22.6 million therms of natural gas annually, which the commission estimated was the equivalent of 200,000 single-family residential installations. A therm measures the potential heat that the natural gas can generate when it is consumed. The text box provides perspective on how this amount of natural gas displacement could affect Californians. The second goal is to achieve the installation of systems that displace 275.7 million kilowatt-hours of electricity annually by the end of 2017, which the commission estimated was the equivalent of 100,800 single-family residential installations. The thermal program does not have a specific goal for propane-displacing systems.

Understanding Therms

Therm=100,000 British thermal units.

British thermal unit=the heat required to raise the temperature of one pound of water by one degree Fahrenheit.

For perspective:

- In 2009 the average home in the United States consumed 726 therms of natural gas.
- Each year 10 million therms of natural gas are enough to meet the needs of approximately 10,000 to 11,000 U.S. homes.
- The goal of the California Solar Initiative Thermal Program (thermal program) is to install enough solar water-heating systems to displace 22.6 million therms annually. This goal, if reached, would be enough to displace the natural gas consumption of about 22,600 to 24,860 homes each year.

Sources: American Gas Association's Web site, the U.S. Energy Information Administration's Web site, and the California State Auditor's analysis of the thermal program's goal.

A 2014 commission report concluded that the thermal program will not install enough solar water-heating systems to meet either goal by 2017. According to our analysis of the commission's solar water-heating installation data, from the thermal program's inception in January 2010 to September 2014, the solar water-heating

systems installed to replace water heaters powered by natural gas displace only 2.7 million therms annually. This figure represents just 12 percent of the program's annual natural gas goal to displace 22.6 million therms. Furthermore, our analysis shows that solar water-heating systems installed to replace electric-powered water heaters displace only about 928,000 kilowatt-hours of electricity annually. This figure represents just 0.3 percent of the program's goal to displace annually 275.7 million kilowatt-hours. These results corroborate the 2014 commission report's conclusion that the thermal program will not meet its goals.

In reaching its conclusions, the 2014 commission report attributes the low participation in the thermal program to significant decreases in natural gas prices and the absence of reductions in installation costs for solar water-heating systems for single-family homes. In an attempt to spur program participation and performance, the commission implemented a number of program design changes beginning in 2012. These program changes included increasing the incentives for single-family systems by 45 percent and the incentives for multifamily or commercial systems by 13 percent. In addition, the commission expanded the scope of the program by allowing participants to receive incentives for other solar water-heating technologies, such as non-single-family swimming pools. Additionally, for 2011 to 2013, the commission authorized a $10 million statewide marketing and outreach campaign to increase awareness of the thermal program.

The 2014 commission report attributes the low participation in the thermal program to significant decreases in natural gas prices and the absence of reductions in installation costs for solar water-heating systems for single-family homes.

In reviewing the incentive levels and progress of the thermal program, the 2014 commission report contained a series of observations, including the following three: First, the commission observed that the 2012 increase in incentive levels did not lead to a significant increase in program participation. Second, the commission observed that the substantial marketing and outreach campaign was largely ineffectual for increasing participation among single-family systems. Lastly, the commission stated that expanding eligibility to new thermal technologies may increase participation, but that it was too soon to determine its impact. Despite the commission's efforts to expand participation, we found that as of September 2014, about $37.5 million, or 12 percent, of the $305.8 million thermal incentive budget had been awarded. As described in the Introduction, the commission requires the investor-owned utilities to collect the funds based upon actual annual expenditures from the prior year to prevent an overcollection of funds from ratepayers. Additionally, the 2014 commission report indicates that further program design changes, even if implemented in full, still may not be enough to spur program participation. Given the lack of participation in the thermal program, the largely ineffectual program design changes, and the fact that the program is unlikely to meet its goals, the Legislature should consider whether it wants to continue authorizing the collection of ratepayers' money to fund the program.

The Clean Air Vehicle Decal Program Needs Periodic Evaluations to Identify Its Strengths and Weaknesses

Like the solar initiative, the Clean Air Vehicle Decal Program (decal program) attempts to improve the State's air quality by offering an incentive that encourages Californians to decrease vehicle emissions by increasing the number of low- and zero-emission vehicles on the road. In helping to administer the decal program, the California Department of Motor Vehicles (Motor Vehicles) issues stickers, commonly referred to as *decals*, to purchasers of clean air vehicles so that single occupants of those vehicles can use highways' carpool lanes. As discussed in the Introduction, state law does not require any of the administering agencies to monitor the goals and objectives of the decal program and none perform such an analysis. Further, Motor Vehicles has not determined whether fees for the decals are covering its program's costs. In addition, the California Department of Transportation (Caltrans) has reported that the number of carpool lanes that do not meet federal speed requirements is increasing, but it does not attribute this increase to drivers who participate in the decal program. Lastly, although the highest concentration of decal recipients live in areas that have not attained certain air quality standards—including counties in the Bay Area and Southern California—the Air Resources Board has not studied the decal program's impact on air quality.

Although No State Agency Measures the Decal Program's Effectiveness, Participation in the Program Has Increased in Recent Years

None of the four state agencies that share in administering the decal program are measuring whether the benefits of the program outweigh its costs or whether the decal program is indeed increasing the number of clean air vehicles on the road, nor are they required to.

The Legislature intended the decal program to increase the number of low- and zero-emission vehicles at little or no cost to the State; however, it did not identify how to measure the success of the program, nor did it direct a state department to perform this analysis. As a result, none of the four state agencies that share in administering the decal program are measuring whether the benefits of the program outweigh its costs or whether the decal program is indeed increasing the number of clean air vehicles on the road.

As the Introduction outlines, state law divides the responsibility for administering the decal program among Motor Vehicles, the Air Resources Board, Caltrans, and the California Highway Patrol (Highway Patrol). For example, Motor Vehicles is responsible for issuing decals to qualifying vehicles, and the Air Resources Board maintains the list of makes and models of qualifying vehicles. Motor Vehicles' chief of budgets (budget chief) stated that Motor Vehicles has not performed a cost-benefit analysis for the decal program due to its limited, ministerial role of issuing decals as directed by statute. According to the Air Resources Board, it supports the decal program and believes that it is an important incentive to encourage

the purchase of clean air vehicles, which are necessary to achieve the State's air quality and climate goals. The Air Resources Board further explained that it has no statistical data showing the impact that the decal program has had on reducing emissions through the increased use of qualifying vehicles. However, the Air Resources Board directed us to a survey conducted by the Center for Sustainable Energy (center) between October 2013 and July 2014, that determined that 15 percent of survey participants credited carpool lane access as the most important reason for purchasing an electric vehicle. The survey further noted that participants reported that saving money on fuel costs and reducing environmental impacts were the two main reasons why participants purchased electric vehicles.

Because no state agency monitors the effectiveness of the decal program, our review of the program's success was limited to assessing the public's demand for decals.

Because no state agency monitors the effectiveness of the decal program, our review of the program's success was limited to assessing the public's demand for decals. As Table 4 on page 11 in the Introduction indicates, the State currently offers two types of decals—green and white—for vehicles meeting certain emission standards. State law, effective January 2012, authorized Motor Vehicles to issue no more than 40,000 green decals to eligible vehicles. In May 2014 the State reached this limit. The State enacted a law in June 2014 to increase the limit on green decals to 55,000, a ceiling that Motor Vehicles reached in September 2014. Also in September 2014, the governor signed another bill increasing to 70,000 the number of green stickers Motor Vehicles could issue. According to the Air Resources Board, the decal program is so popular with consumers that there were more eligible applicants than available decals, causing the Legislature to raise the limit on green decals. The Air Resources Board also stated that in enacting this legislation, the Legislature presumably had weighed the merits of continuing the program and determined that the benefits of doing so, such as encouraging the commercialization of advanced-technology vehicles, outweighed any costs associated with this expansion of the decal program.

Furthermore, the public's demand for white decals—available for vehicles that use only electric batteries, hydrogen fuel cells, or compressed natural gas—has also risen in recent years. However, the State has not limited the number of white decals that can be issued. Motor Vehicles' data show that it issued nearly 13,400 white decals from 2010 to 2012 and that demand increased in 2013 and 2014—it issued 18,200 and 26,400 decals, respectively, in those years. The demand for decals indicated by Motor Vehicles' data appears to support the Air Resources Board's view that the program is popular with consumers and that it may encourage the purchase of clean air vehicles.

Motor Vehicles' Decal Application Fee Is Not Sufficient to Cover the Decal Program's Administrative Costs

Motor Vehicles should be charging $15 per decal—rather than $8—if it is to cover its costs for administering the decal program.

Although state law requires Motor Vehicles to collect a decal fee sufficient to reimburse the department for its actual costs incurred to operate the decal program, Motor Vehicles does not track whether the application fees are sufficient to recover the amount it spends to administer the decal program. Since early 2002 Motor Vehicles has charged applicants a one-time fee of $8 to obtain a set of clean air vehicle decals. However, according to our calculations, Motor Vehicles should be charging $15 per decal if it is to cover its costs for administering the decal program. According to the chief of Motor Vehicle's Financial Services Branch, the decal program is entirely funded through the Motor Vehicle Account. In addition, he stated that this account receives fee revenue from many of Motor Vehicles' programs, including the decal program. Until Motor Vehicles performs a full cost analysis to update the application fee, revenue from other programs contributing to the Motor Vehicle Account will continue to support the decal program.

Motor Vehicles has not updated the decal fee since the inception of the white decal program in 2000. Motor Vehicles' cost accounting unit manager indicated that the department likely performed a cost analysis in 1999 to establish the white decal program's $8 fee, but it does not have a record of that analysis. In December 2003 Motor Vehicles performed a cost analysis when legislation was first proposed to establish the now-discontinued yellow decal program for hybrid cars. At that time, Motor Vehicles estimated that each decal would cost the department $8.63 to process. According to the budget chief, the cost per decal was close enough to the existing fee of $8 that Motor Vehicles did not seek to increase it. However, he acknowledges that Motor Vehicles has not performed an analysis of its actual costs to administer the decal program since that time.

Because no cost analysis of the decal program has occurred since 2003, Motor Vehicles does not know whether the decal application fee of $8 is sufficient to cover program costs. The budget chief explained that Motor Vehicles has not performed a full cost evaluation for the decal program primarily because the program was always intended to be short term, and because a number of times the program end dates in state and federal law were extended, often with short notice. He stated that doing a full cost evaluation would be expensive relative to the fees received, and changing the fee would require going through the public rule-making process, which could take about a year and might not take effect until after the program expires.

Although Motor Vehicles indicated that performing a full cost analysis would be expensive, it already collects data for many of the elements it needs to perform such an evaluation. For example, Motor Vehicles completes weekly reports indicating how much time staff spend working on the decal program and keeps updated information on the cost of printed items,

such as envelopes, decal registration cards, and the decals themselves. Therefore, Motor Vehicles could readily gather the information needed to perform a periodic cost analysis of the decal program. Further, the original sunset date of January 2008 for the decal program has been extended multiple times, and it is now set for January 2019. History thus suggests that this date could be extended again in the future. Because the decal program has been active for 14 years, indicating that the program is more permanent than temporary, it is reasonable to expect Motor Vehicles to analyze periodically the sufficiency of the decal fee to recover Motor Vehicles' program costs.

Because the decal program has been active for 14 years, indicating that the program is more permanent than temporary, it is reasonable to expect Motor Vehicles to analyze periodically the sufficiency of the decal fee to recover Motor Vehicles' program costs.

Using costs the program incurred during fiscal year 2013–14, we determined that to fully cover program costs, Motor Vehicles should increase the decal fee to $15 from its current level of $8. Furthermore, our review found that it cost Motor Vehicles, the only department that reports costs for the decal program, approximately $711,000 to administer the decal program in fiscal year 2013–14 and collected fees of $384,000. We estimate that if it had raised the application fee to $15, Motor Vehicles would have collected an additional $336,000 in fees for fiscal year 2013–14. Motor Vehicles agrees with our assessment that in fiscal year 2013–14 the cost per decal was $15, and its budget chief stated that Motor Vehicles intends to perform a full cost analysis of the decal program by January 2016 and that it will update the decal fee accordingly.

Caltrans' Monitoring Indicates That Congestion in Carpool Lanes Is Increasing, but Vehicles With Decals Do Not Appear to Be a Significant Factor

In examining speeds in California's carpool lanes, Caltrans determined that although carpool lanes have become increasingly congested during recent years, vehicles with decals do not play a major role in lane slowdowns. Although state law does not require Caltrans to review the success of the decal program, Caltrans is required to review the vehicle speeds of carpool lanes. Federal law gives Caltrans the authority to allow clean air vehicles to use carpool lanes provided that the lanes maintain minimum average operating speeds. It defines the minimum average operating speed as 45 miles per hour in carpool lanes on highways that have a speed limit of 50 miles per hour or greater.

To meet the federal 45-mile-per-hour standard for carpool lanes, Caltrans must monitor and assess the performance of carpool lanes and report its findings to the federal government detailing the impacts of low-emission vehicles on those lanes. If lane speeds fall below the minimum average operating speed of 45 miles per hour 90 percent of the time over a consecutive 180-day period, the federal government requires that Caltrans take steps to improve the lane speeds. These steps can include increasing the minimum number of occupants per vehicle or discontinuing clean air vehicles' use of carpool lanes. Failure to meet this standard can result in sanctions from the federal government, which may include the withholding of federal payments.

In its July 2014 report on the condition of the State's carpool lanes, Caltrans found that 759, or 57 percent, of 1,339 carpool lane miles fell below the minimum speed standards from July to December 2012. The report states that the factors causing these speed reductions include, among other things, recurring congestion, vehicles attempting to enter or exit carpool lanes, inclement weather, and other traffic disruptions. The report compared these data with observations that Caltrans made from July 2011 to December 2011 and found that the percentage of carpool lanes operating below minimum average speeds increased by 16 percent. In fact, Caltrans noted that this percentage increased even after the State eliminated carpool lane access for 85,000 vehicles when the yellow decal program ended in June 2011. Therefore, Caltrans' report does not conclude that the decal program is a significant cause of congestion in carpool lanes. Further, in its July 2014 action plan to improve the average speeds in carpool lanes, Caltrans states that it is not considering prohibiting vehicles with decals from using carpool lanes, because Caltrans concludes that they make up a very low percentage of the total number of vehicles in carpool lanes. Instead, the action plan proposes a combination of short-term and long-term strategies to improve average lane speeds, such as increasing Highway Patrol enforcement, improving response times for vehicles that become disabled in carpool lanes, and improving infrastructure on corridors with carpool lanes.

In addition to its annual report to the federal government on the performance of the State's carpool lanes, Caltrans collects data on the total number of vehicles and the vehicle occupancy counts for carpool lanes, including the number of vehicles with decals. Caltrans' data indicate that between 2006 and 2011, the number of vehicles with decals was relatively constant and did not surpass 7 percent of the total carpool lane volume for any of the six Caltrans districts that had carpool lanes.

Motor Vehicles Collects the Geographic Locations of Decal Recipients, but Air Resources Board has not Assessed the Decal Program's Impact on Air Quality

The Air Resources Board has not assessed the decal program's impact on air quality nor is it required to perform an assessment.

Our review of Motor Vehicles' decal recipient data found that some of the counties with the highest concentration of decals tend to be in areas that have not met certain air quality standards and in areas that possess a significant number of carpool lanes; however, the Air Resources Board has not assessed the decal program's impact on air quality nor is it required to perform an assessment. For example, per capita, Santa Clara County has significantly more decals than the rest of the State, as Table 7 shows. Specifically, approximately nine out of every thousand residents in Santa Clara County possess clean air vehicle decals, which is almost three more people per thousand than the next highest county, Marin. Table 7 also illustrates that the top five counties with the highest total number of decals issued—Los Angeles, Santa Clara, Orange, Alameda, and San Diego—possess nearly 70 percent of the existing carpool lane miles

in the State. Further, Figure 2 on page 33 shows that these five counties reside in air basins that have failed to meet the U.S. Environmental Protection Agency's national 8-hour ozone standard in 2011. This standard establishes the concentration above which ozone is known to cause adverse health effects to sensitive groups, such as children and the elderly. Ozone is a colorless gas and is the chief component of urban smog. It is not directly emitted as a pollutant, but it is formed in the atmosphere when hydrocarbon and oxides of nitrogen emissions—which vehicles emit—react in the presence of sunlight. According to the Air Resources Board, because of the reaction time involved for ozone to form, peak ozone concentrations often occur far downward of the oxides of nitrogen emissions. In other words, ozone concentrations can occur in areas other than where the oxides of nitrogen are emitted. It is important to note that ozone is one of a series of seven pollutants adopted by both the federal government and California to measure air quality; therefore, ozone by itself does not provide a complete picture of the air quality in California.

Table 7
Number of Decals Issued Under the Clean Air Vehicle Decal Program and Miles of Existing Carpool Lanes

COUNTY	GREEN DECALS ISSUED	WHITE DECALS ISSUED	TOTAL DECALS ISSUED	DECALS ISSUED PER ONE THOUSAND RESIDENTS	MILES OF EXISTING CARPOOL LANES (IN LANE-MILES)
1,000 or More Total Decals Issued					
Los Angeles	16,173	17,581	33,754	3.4	521.2
Santa Clara	7,404	9,143	16,547	8.9	184.6
Orange	7,523	7,716	15,239	4.9	215.7
Alameda	3,369	4,373	7,742	4.9	84.0
San Diego	2,717	3,625	6,342	2.0	112.6
San Mateo	1,751	2,685	4,436	6.0	13.6
Contra Costa	2,152	2,082	4,234	3.9	83.0
San Francisco	721	2,234	2,955	3.5	0.0
Riverside	1,545	1,302	2,847	1.2	84.9
San Bernardino	1,489	781	2,270	1.1	106.2
Sacramento	980	1,217	2,197	1.5	76.9
Ventura	1,101	533	1,634	1.9	0.5
Marin	694	874	1,568	6.1	33.8
Sonoma	806	725	1,531	3.1	42.6
Out-of-State	112	1,303	1,415	–	0.0
Solano	528	495	1,023	2.4	17.3
500–999 Total Decals Issued					
Placer	418	403	821	2.2	9.6
Santa Cruz	412	407	819	3.0	0.0
100–499 Total Decals Issued					
San Joaquin	278	145	423	0.6	0.0
Monterey	214	123	337	0.8	0.0
Yolo	136	194	330	1.6	0.0

continued on next page . . .

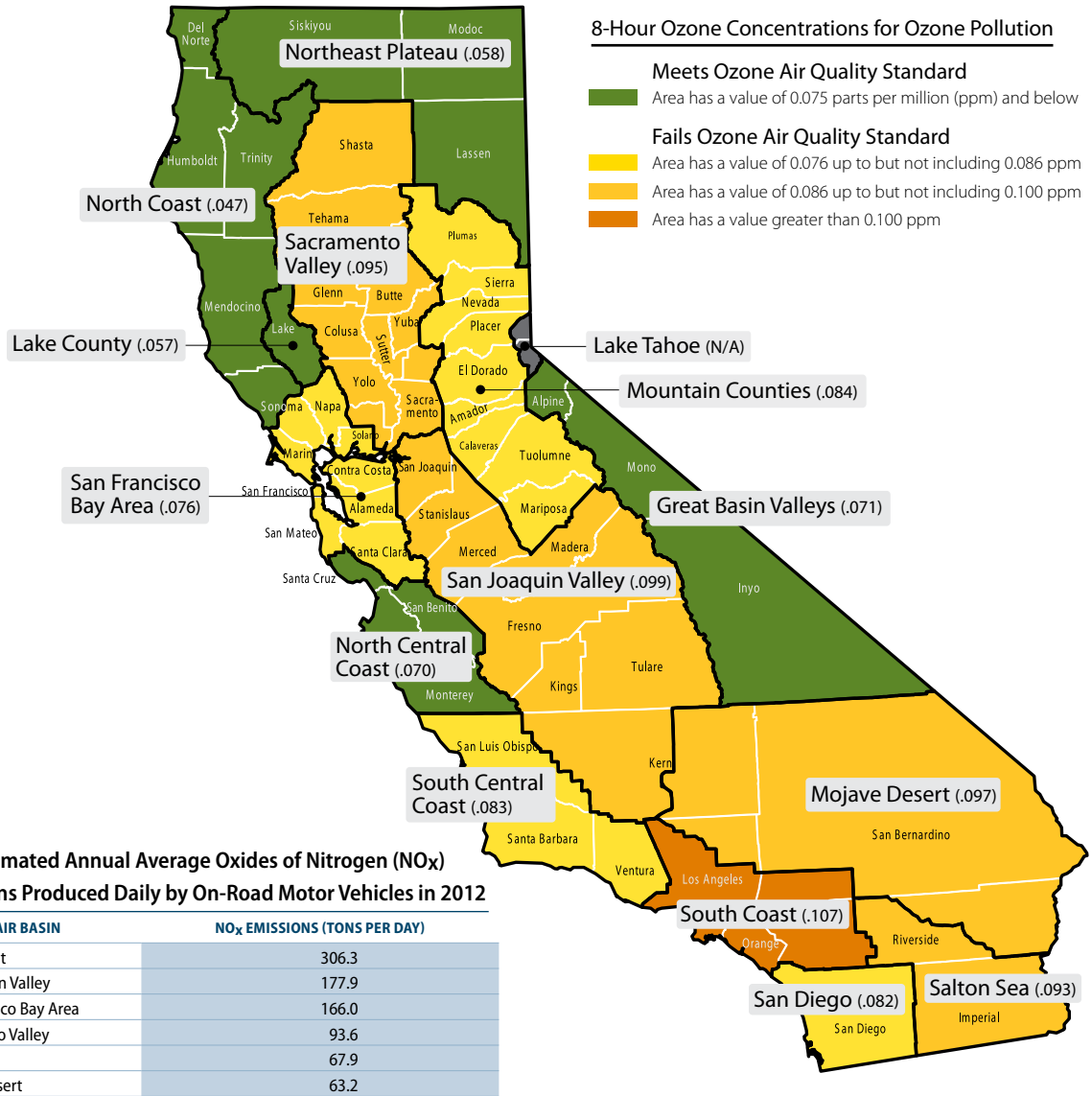
COUNTY	GREEN DECALS ISSUED	WHITE DECALS ISSUED	TOTAL DECALS ISSUED	DECALS ISSUED PER ONE THOUSAND RESIDENTS	MILES OF EXISTING CARPOOL LANES (IN LANE-MILES)
Napa	164	149	313	2.2	0.0
El Dorado	180	127	307	1.7	13.2
Santa Barbara	136	94	230	0.5	0.0
Fresno	64	155	219	0.2	0.0
San Luis Obispo	76	47	123	0.5	0.0
Kern	63	55	118	0.1	0.0
0–99 Total Decals Issued					
32 Remaining Counties	398	257	655	0.2	0.0
Totals	**51,604**	**58,825**	**110,429**	**2.9**	**1,599.7**

Sources: Decal data are from the California Department of Motor Vehicles (Motor Vehicles) decal database as of August 2014. Population data are from the California Department of Finance's January 2014 population estimate. Carpool lane-mile data are from the California Department of Transportation, as of July 2014. Data is unaudited.
Note: We excluded 1,185 decals from the table because Motor Vehicles either did not record a county code or recorded an invalid county code.

In fact, according to the Air Resources Board's 2013 report, *The California Almanac of Emissions and Air Quality* (air quality almanac), nine of the State's 15 air basins failed to meet the same federal ozone air quality standard in 2011. As Figure 2 shows, the five air basins with the highest concentration of ozone pollution are the South Coast, San Joaquin Valley, Mojave Desert, Sacramento Valley, and Salton Sea air basins. Notably, there are few or no carpool lanes in the San Joaquin Valley air basin and very few decals issued to counties within this air basin as well. Therefore, the decal program provides minimal incentive for residents of these counties to purchase clean air vehicles. The Air Resources Board points out that carpool lanes are one of a number of strategies that can be used to improve air quality in regions with high vehicle emissions and traffic congestion. Figure 2 also shows the counties having the highest oxides of nitrogen emissions produced by on-road motor vehicles in 2012.

Further, the air quality almanac explains that other factors besides emissions, such as weather and terrain, influence air quality. For example, hot, sunny summer days typically lead to high ozone, and the mountains that form a barrier to the east of the Los Angeles area tend to retain air and limit the dispersion of pollutants, including ozone. Although the decal program might have some effect on air quality, the Air Resources Board indicates that it has not produced an air-basin pollution study to demonstrate the decal program's contribution to improved air quality. The Air Resources Board further explained that such a study would be costly to administer, and any results would be difficult to correlate to the decal program because the State is simultaneously undertaking actions in addition to the decal program to reduce air pollution and minimize greenhouse gases in California. Until the Air Resources Board evaluates the potential connection between the decal program and the State's air quality, the full impact of the program will be unknown.

Figure 2
2011 California Ozone Air Quality and 2012 On-Road Motor Vehicles' Oxides of Nitrogen Emissions



Estimated Annual Average Oxides of Nitrogen (NO_X) Emissions Produced Daily by On-Road Motor Vehicles in 2012

AIR BASIN	NO_X EMISSIONS (TONS PER DAY)
South Coast	306.3
San Joaquin Valley	177.9
San Francisco Bay Area	166.0
Sacramento Valley	93.6
San Diego	67.9
Mojave Desert	63.2
South Central Coast	38.4
Salton Sea	29.5
North Central Coast	26.4
Mountain Counties	22.2
North Coast	17.6
Northeast Plateau	7.5
Great Basin Valleys	3.0
Lake County	2.7
Lake Tahoe	1.5
Total	**1,023.7**

Sources: Ozone pollution data are from *The California Almanac of Emissions and Air Quality*, 2013. Motor vehicle emissions data are from the California Air Resources Board's Web site. Ozone ranges are based on the U.S. Environmental Protection Agency's 2008 8-Hour Ozone Concentrations.

Note: Motor vehicles emit other pollutants in addition to NO_X, such as hydrocarbons, oxides of sulfur, particulate matter, and carbon monoxide. We selected NO_X as the pollutant to report in this figure because many NO_X compounds contribute to the formation of ozone, the chief component of urban smog. Therefore, it is important to note that other air pollutants besides ozone that impact air quality are not captured in this figure. Additionally, motor vehicles are not the only producer of NO_X emissions; other sources that produce NO_X emissions contribute to the ozone pollution captured in this figure. In many cases, areas that fail to meet the national ozone standard reflect only a portion of an air basin.

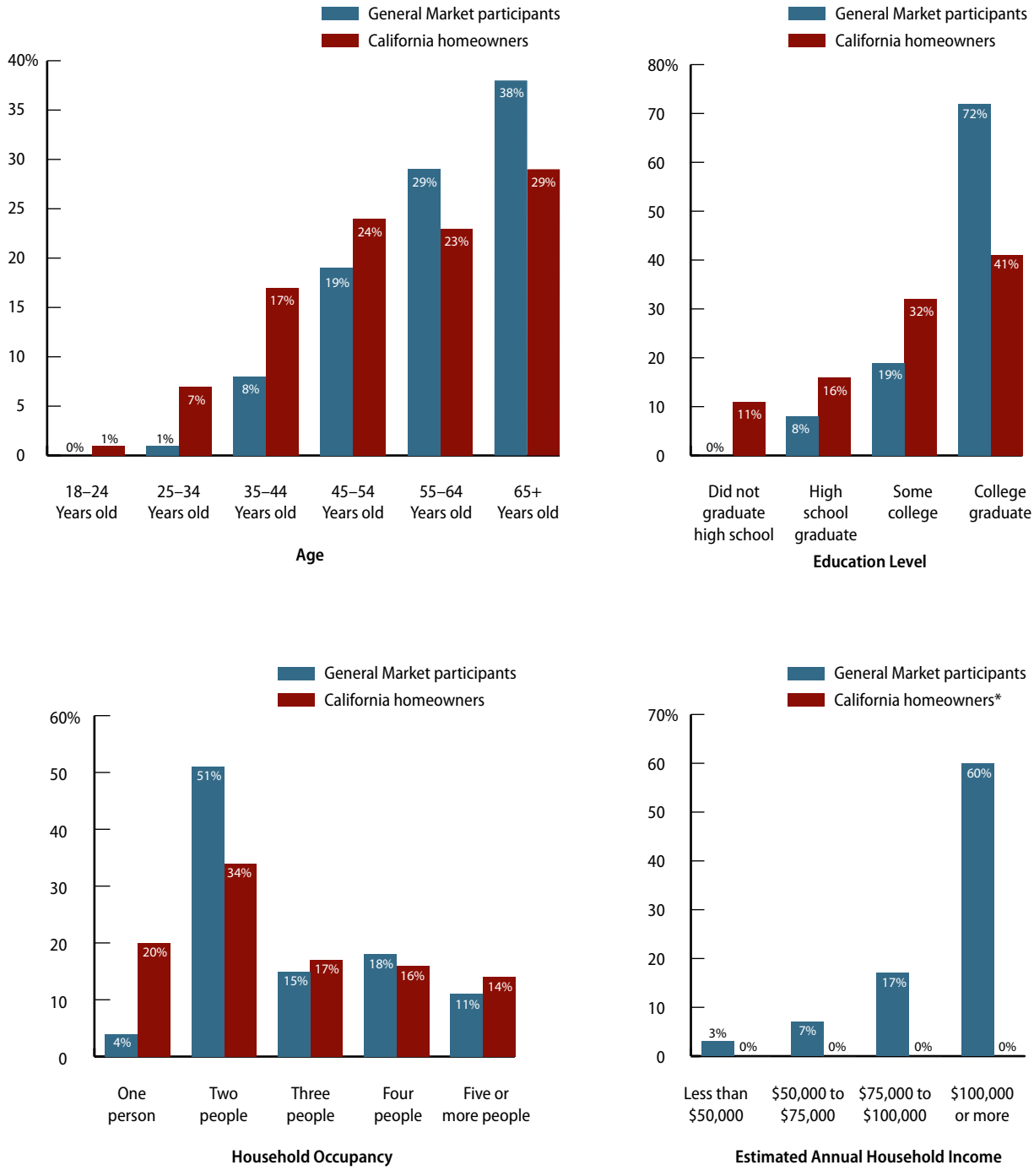
Both the Solar Initiative and the Decal Program Tend to Serve Californians With Higher Incomes

While participation in both the solar initiative and the decal program has increased over time, both programs have served mostly a narrow demographic of Californians. In requesting this audit, the Joint Legislative Audit Committee asked us to determine whether the incentives received through both programs were used equally across the State in terms of demographic characteristics, such as age, race, gender, and income level. Specifically, the available demographic data show that participants in the solar initiative tend to be older, wealthier, and have received more education than most California homeowners. Similarly, most decal program participants tend to have a higher income than the average Californian.

Although the commission is not required to collect demographic information from solar initiative participants, the 2014 consultant's study discussed earlier, which surveyed a random sample of 72 out of 86,848 residential participants in the General Market Program from 2007 through 2012, determined that the participants were older, wealthier, and received more education than the population of California homeowners as a whole. As Figure 3 illustrates, most participants are at least 55 years old, have a college education, and live in two-person households with annual household incomes of $100,000 or more. Furthermore, the 2014 consultant's study concluded that the high percentage of participants who live in two-person households indicates that many participants are parents of grown children or that many have dual incomes but no children. This survey did not assess the race or ethnicity of residential participants and did not analyze the demographics of nonresidential participants or participants of the single-family, multifamily, and thermal programs. Overall, the consultant's study concluded that the residential participants' diversity remained unchanged from 2007 through 2012. Despite these demographic results, as described earlier, the solar initiative has two dedicated low-income programs—the single-family program and the multifamily program—that provide financial incentives for the installation of solar energy systems on low-income housing. Considering that the solar initiative will largely end in less than two years and a majority of the incentives have been awarded, the consultant's study is the best source of the demographic results for the program.

Despite these demographic results, the solar initiative has two dedicated low-income programs—the single-family program and the multifamily program—that provide financial incentives for the installation of solar energy systems on low-income housing.

Figure 3
Demographics of Residential Participants in the California Solar Initiative's General Market Program



Sources: *California Solar Initiative Market Transformation Study (Task 2)*, 2014, prepared for the California Public Utilities Commission by Navigant Consulting, Inc. Household income analysis based on U.S. Census Bureau's *2007–2011 American Community Survey*, 2013.

* According to the *2007 American Community Survey*, the median household income for California homeowners was $79,138. The figures for annual household income are reported in 2011 inflation-adjusted dollars.

In addition to conducting the demographic survey, the consultant randomly surveyed 300 single-family residential customers across all income levels who do not own solar energy systems and determined that the high cost of a solar energy system was the main reason why residential customers had not installed them. The 2014 consultant's study found that almost half of the respondents—43 percent—wanted to see cheaper prices before they would purchase a solar energy system. As the Introduction discusses and as Table 2 on page 8 shows, a typical 5-kilowatt solar energy system installed at a residential property under the solar initiative in 2014 costs about $17,045 after discounting for both the solar initiative incentive and federal tax credit. Even if the customer receives both incentives, the installation of a solar energy system is a significant investment. The consultant suggested that many residential customers perceive a solar energy system's high cost as a primary obstacle in customers' adoption of solar technology. Thus, the economics of purchasing solar energy systems may explain why wealthier households participate in the solar initiative at higher rates than do households with average or low incomes.

The economics of purchasing solar energy systems may explain why wealthier households participate in the solar initiative at higher rates than do households with average or low incomes.

Further, this consultant conducted in-depth interviews with solar finance companies, installers, manufacturers, and other market participants that possess intimate knowledge of the solar market, and the study concluded that marketing to less creditworthy customers did expand the overall adoption of solar energy systems, but that this expansion is only a limited form of diversification. When asked why the demographics have remained the same from 2007 to 2012, these interview respondents stated that solar finance companies and installation contractors tended not to change the target of their marketing efforts during this period except to offer financing for solar projects to customers with low credit scores. Specifically, respondents at solar finance companies stated that they have found it necessary to diversify their target customer profiles slowly in order to gain the confidence of investors.

In regard to the decal program, none of the state agencies administering the decal program obtain demographic information on decal recipients and, according to the Air Resources Board and Motor Vehicles, this is not within the scope of their respective roles under state law. As a result, we were unable to determine whether the decal program was used equally across the State in terms of age, race, gender, and income level.

Although the administering state agencies do not obtain demographics, a recent consumer survey for a related clean air vehicle incentive program provides certain demographic information with respect to the decal program. On behalf of the Air Resources Board, the center administers state rebates for purchasers of clean air vehicles. Specifically, the center provides individuals, nonprofits, government entities, and business owners with rebates of up to $5,000 for the

purchase or lease of zero-emission and certain plug-in hybrid vehicles. From October 2013 through July 2014, the center conducted a survey of rebate recipients to provide market data on various demographic and behavioral topics, including age, gender, and income. However, the survey results do not fully represent the demographics of decal recipients. For example, the center noted that although 90 percent of the 10,900 respondents intend to obtain decals, 10 percent have no plans to obtain a decal.

In addition, the center offers the survey only to clean air vehicle owners who received a rebate; however, not every clean air vehicle owner applies for a rebate, nor is every clean air vehicle eligible for a rebate. As a result, the survey results do not represent all recipients of decals. Nonetheless, because most survey respondents intend to obtain decals, the survey results indicate who is purchasing clean air vehicles and participating in the decal program. As the text box shows, there is a roughly even distribution in the ages of survey respondents, but most respondents were male and earned $100,000 or more. Although equal access is not an explicit goal for the decal program, it is noteworthy that participants tend to have a higher income than the average Californian. According to a 2013 action plan developed by the Governor's Interagency Working Group on Zero-emission Vehicles, zero-emission vehicles are currently more expensive than equivalent conventional models, and the higher initial costs prevent many California consumers from purchasing these vehicles. These higher costs mean that decal program participants generally earn the higher-level incomes needed to purchase vehicles that qualify for the program.

Key Demographic From a Survey of Rebate Recipients

Age:

- 55 years and older = 35 percent
- 45-54 years = 30 percent
- 18-44 years = 35 percent

Gender:

- Male = 78 percent
- Female = 22 percent

Income Level:

- $100,000 or more = 78 percent
- $99,999 or less = 22 percent

Source: Center for Sustainable Energy's *Dashboard for the Electric Vehicle Consumer Survey*.

Recommendations

The Solar Initiative

To make certain that the research program contributes to the goals of the solar initiative, the commission should conduct a program evaluation before the remaining grant projects are completed.

Because the thermal program has not been successful in meeting the goals outlined in state law, the Legislature should consider whether it wants to continue authorizing the collection of ratepayers' money to fund the program.

To show how air pollution emissions reductions related to the solar initiative benefit the State, the commission should include in future reports the measurable benefits of those reductions.

The Decal Program

To learn whether the decal program helps to reduce the State's air pollution, the Legislature should require the Air Resources Board to research whether there is a relationship between decal usage and a change in the State's air quality.

To ensure that the decal fee is sufficient to reimburse program costs, Motor Vehicles should periodically perform a full cost analysis of the decal program and update the fee accordingly.

We conducted this audit under the authority vested in the California State Auditor by Section 8543 et seq. of the California Government Code and according to generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives specified in the scope section of the report. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Respectfully submitted,

Elaine M. Howle

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Appendix

GEOGRAPHIC LOCATIONS OF CALIFORNIA SOLAR INITIATIVE INSTALLATIONS AND INCENTIVES

Table A.1 shows the megawatt capacity and total incentives received for installed and pending solar energy systems for each of the 53 counties participating in the California Solar Initiative (solar initiative) from January 2007 to September 2014. As the Introduction mentions, the solar initiative issued or reserved incentives for more than 149,000 solar energy system installations throughout the State, with many incentives concentrated in southern and central California. The top five counties based on the total amount of incentives issued or reserved are Los Angeles, San Diego, Riverside, Santa Clara, and San Bernardino.

Table A.1
Total Incentives Received and Pending and Megawatt Capacity Installed and Pending by County for Solar Energy System Installations Under the California Solar Initiative
2007 to 2014
(Dollars in Thousands)

	TOTAL INCENTIVES RECEIVED AND PENDING			MEGAWATT CAPACITY INSTALLED AND PENDING		
COUNTY	RESIDENTIAL	NONRESIDENTIAL	TOTAL	RESIDENTIAL	NONRESIDENTIAL	TOTAL
More Than $50 Million in Incentives						
Los Angeles	$83,427	$173,047	$256,474	99.71	143.45	243.17
San Diego	70,092	126,570	196,662	92.47	94.16	186.63
Riverside	71,462	105,883	177,346	92.65	91.15	183.81
Santa Clara	33,871	106,682	140,553	39.33	73.61	112.94
San Bernardino	43,698	92,135	135,833	55.09	76.11	131.20
Orange	48,031	73,301	121,332	56.28	60.91	117.18
Contra Costa	25,355	62,592	87,947	26.98	49.50	76.48
Kern	17,706	67,902	85,608	24.78	59.69	84.48
Fresno	27,601	51,190	78,791	30.19	53.84	84.04
Alameda	21,570	48,044	69,615	21.58	41.24	62.82
Tulare	17,889	48,381	66,270	15.92	45.39	61.31
Ventura	21,280	34,247	55,527	24.75	29.37	54.12
Sonoma	17,021	35,548	52,569	18.34	26.63	44.98
$10 to $50 Million in Incentives						
San Mateo	10,651	20,806	31,457	11.59	17.63	29.22
Solano	6,280	22,829	29,109	5.96	14.66	20.62
Yolo	7,412	19,858	27,270	6.48	14.79	21.27
San Joaquin	6,785	20,351	27,136	8.71	25.65	34.36
San Luis Obispo	9,439	15,755	25,194	8.13	10.31	18.44
Santa Barbara	11,972	10,860	22,832	8.18	7.09	15.27
Monterey	9,193	13,501	22,694	5.11	15.25	20.36
Napa	5,443	16,456	21,898	5.43	13.79	19.21

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	TOTAL INCENTIVES RECEIVED AND PENDING			MEGAWATT CAPACITY INSTALLED AND PENDING		
COUNTY	RESIDENTIAL	NONRESIDENTIAL	TOTAL	RESIDENTIAL	NONRESIDENTIAL	TOTAL
Placer	$11,134	$10,173	$21,307	15.04	6.80	21.83
Butte	5,751	14,560	20,311	5.63	12.48	18.11
Kings	3,837	16,421	20,258	4.34	23.30	27.64
Lake	3,880	14,996	18,876	1.48	4.58	6.06
San Francisco	13,347	3,752	17,099	9.09	3.41	12.51
Merced	2,607	13,061	15,668	3.70	11.03	14.73
Marin	8,759	6,239	14,998	7.77	4.04	11.80
Stanislaus	1,733	11,503	13,236	2.05	6.53	8.59
Santa Cruz	5,842	6,467	12,309	6.36	7.33	13.69
Madera	3,436	8,781	12,218	4.21	10.35	14.55
$1 to $10 Million in Incentives						
Mendocino	2,809	5,571	8,380	1.76	2.67	4.43
El Dorado	5,664	2,244	7,908	8.06	2.16	10.22
Shasta	3,445	3,594	7,039	3.09	2.07	5.16
Inyo	1,936	4,944	6,880	0.53	1.15	1.68
Colusa	359	5,874	6,233	0.47	6.30	6.77
Sutter	2,148	3,786	5,934	2.27	3.78	6.05
Yuba	1,723	4,053	5,776	1.58	6.05	7.63
Mono	829	4,653	5,482	0.58	1.36	1.94
Tehama	2,562	2,512	5,075	1.26	4.52	5.77
Glenn	1,688	1,884	3,571	1.09	3.43	4.51
Calaveras	2,971	463	3,434	2.37	0.43	2.80
Nevada	2,746	521	3,267	3.37	0.69	4.06
Plumas	498	2,663	3,161	0.69	1.65	2.34
San Benito	1,406	1,665	3,072	1.14	2.67	3.81
Humboldt	1,141	347	1,488	0.61	0.30	0.91
Amador	816	413	1,229	0.99	0.61	1.60
Tuolumne	1,069	104	1,173	0.98	0.27	1.24
Mariposa	293	739	1,032	0.40	0.66	1.06
Less Than $1 Million in Incentives*						
Lassen	56	256	312	0.07	0.38	0.45
Sacramento	163	45	208	0.17	0.04	0.21
Imperial	43	10	53	0.03	0.03	0.06
Trinity	5	–	5	0.01	–	0.01
Totals	**$660,874**	**$1,318,232**	**$1,979,109**	**748.84**	**1,095.30**	**1,844.14**

Source: California State Auditor's analysis of unaudited data from the California Public Utilities Commission as of September 2014.

Notes: Table A.1 includes data for all solar energy systems installed and pending installation from the General Market, Single-Family Affordable Solar Homes, and Multifamily Affordable Solar Housing programs.

We excluded five counties from this table:

1. Alpine, Sierra, and Siskiyou counties had no residents who completed solar energy system installations or received solar incentives under the California Solar Initiative (solar initiative).
2. Del Norte and Modoc counties are not eligible to participate in the solar initiative because they do not receive electricity service from Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), or Southern California Edison Company (SCE), which are the investor-owned utilities that provide the incentives for the three solar initiative programs mentioned above.

* The counties listed under the heading *Less Than $1 Million in Incentives* have fewer incentives because PG&E, SDG&E, or SCE provides electricity service to only small areas of these counties. To be eligible for an incentive under the solar initiative, the project site must be within the service area of and receive retail-level electricity service from one of the aforementioned investor-owned utilities.

Table A.2 shows the total incentives received and pending for installed and pending solar water-heating systems and the total incentives per thousand residents for the 44 counties participating in the California Solar Initiative Thermal Program (thermal program) from January 2010 to September 2014. As the Introduction explains, the thermal program issued or reserved incentives for more than 2,400 solar water-heating installations throughout the State, with many incentives concentrated in central and southern California. The top five counties based on the total amount of solar water-heating incentives issued or reserved are Los Angeles, San Diego, Alameda, San Francisco, and Riverside.

Table A.2
California Solar Initiative's Thermal Program
Total Incentives Received and Pending by County
2010 to 2014
(Dollars in Thousands)

COUNTY	TOTAL INCENTIVES RECEIVED AND PENDING	TOTAL INCENTIVES RECEIVED AND PENDING PER THOUSAND RESIDENTS
More Than $500,000 in Incentives		
Los Angeles	$12,886	$1,280
San Diego	6,144	1,920
Alameda	3,302	2,100
San Francisco	2,891	3,460
Riverside	2,587	1,130
Santa Clara	1,472	790
Orange	1,088	350
San Bernardino	890	430
Sacramento	682	470
Fresno	579	600
Yolo	536	2,600
Contra Costa	515	470
$100,000 to $500,000 in Incentives		
Butte	488	2,200
San Mateo	412	550
Ventura	327	390
Sonoma	284	580
Solano	153	360
Santa Barbara	131	300
Kern	129	150
Imperial	123	680
Marin	119	470
Monterey	116	270

continued on next page . . .

COUNTY	TOTAL INCENTIVES RECEIVED AND PENDING	TOTAL INCENTIVES RECEIVED AND PENDING PER THOUSAND RESIDENTS
$25,000 to $100,000 in Incentives		
Kings	$95	$640
Santa Cruz	74	270
El Dorado	65	360
San Benito	63	1,100
Merced	63	240
Shasta	46	260
Tulare	34	70
Nevada	29	290
Placer	26	70
Less Than $25,000 in Incentives		
San Joaquin	25	30
San Luis Obispo	19	70
Humboldt	15	110
Amador	6	170
Sutter	6	60
Tuolumne	5	90
Napa	4	30
Lake	3	50
Mendocino	3	30
Yuba	2	30
Inyo	2	90
Mono	1	80
Calaveras	1	20
Total	**$36,441***	**NA**

Sources: California State Auditor's analysis of unaudited data from the California Public Utilities Commission as of September 2014. These records include data for all solar water-heating systems installed and pending installation under the California Solar Initiative's Thermal Program (thermal program) from May 2010 through September 2014. In addition, this table uses the California Department of Finance's January 2014 population estimates.

Notes: We excluded 14 counties from this table:

1. Alpine, Colusa, Glenn, Lassen, Madera, Mariposa, Plumas, Sierra, Siskiyou, Stanislaus, Tehama, and Trinity counties had no residents who received thermal incentives because no residents completed solar water-heating system installations under the thermal program.
2. Del Norte and Modoc counties are not eligible to participate in the thermal program because they do not receive electricity or gas service from the Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Gas Company, or Southern California Edison Company, which are the investor-owned utilities that provide the incentives for the thermal program. To be eligible for an incentive under the thermal program, the project site must be within the service area of and receive retail-level gas or electricity service from one of the aforementioned investor-owned utilities.

NA = Not applicable.

* We excluded $1,101,000 from this figure because the thermal program did not record a county for 23 solar water-heating applications.

CalSTA
CALIFORNIA STATE TRANSPORTATION AGENCY

Edmund G. Brown Jr.
Governor

Brian P. Kelly
Secretary

915 Capitol Mall, Suite 350B
Sacramento, CA 95814
916-323-5400
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January 23, 2015

Elaine M. Howle, California State Auditor
California State Auditor's Office
555 Capitol Mall, Suite 300
Sacramento, CA 95814

Dear Ms. Howle:

Attached please find a response from the California Department of Motor Vehicles (Department) to your redacted draft audit report *California's Alternative Energy and Efficiency Initiatives: Two Programs Are Meeting Most Goals, but Several Improvements Are Needed* (#2014-124). Thank you for allowing the Department and the California State Transportation Agency (Agency) the opportunity to respond to the report.

As noted in its response, the Department concurs with the recommendation noted in the report and already has begun implementing corrective action. Additionally, we appreciate your identification of an opportunity for improvement.

If you need additional information regarding the Department's response, please do not hesitate to contact Michael Tritz, Agency Deputy Secretary for Audits and Performance Improvement, at (916) 324-7517.

Sincerely,

BRIAN P. KELLY
Secretary

Attachment

cc: Jean M. Shiomoto, Director, California Department of Motor Vehicles

CALIFORNIA STATE TRANSPORTATION AGENCY
EDMUND G. BROWN JR., *Governor*

OFFICE OF THE DIRECTOR
DEPARTMENT OF MOTOR VEHICLES
P.O. BOX 932328
SACRAMENTO, CA 94232-3280

January 22, 2015

Brian P. Kelly, Secretary
California State Transportation Agency
915 Capitol Mall Drive, Suite 350-B
Sacramento, CA 95814

Dear Secretary Kelly:

The Department of Motor Vehicles (DMV) thanks the State Auditor for the opportunity to respond to its draft report, issued January 15, 2015.

At the request of the Joint Legislative Audit Committee, the State Auditor's audit of *California's Alternative Energy and Efficiency Initiatives: Two Programs are Meeting Most Goals, but Several Improvements Are Needed* included a review and evaluation of the roles and responsibilities of DMV and a determination of whether DMV complies with applicable laws, rules, and regulations. The State Auditor concluded that DMV does not ensure that it has collected the appropriate amount of fees to recover costs for the program.

The State Auditor's recommendation and DMV's response (in bold) are listed below:

Recommendation:

1. To ensure that the decal fee is sufficient to reimburse program costs, Motor Vehicles should periodically perform a full cost analysis of the decal program and update the list accordingly.

Response:
DMV concurs with this recommendation that a periodic analysis should be performed of the decal program to update the fee. DMV has initiated this review and will continue periodic reviews as needed and increase the fee accordingly.

DMV appreciates the opportunity to provide a response to the draft audit report. If you have any questions or require further information, please contact Barbara J. Owens, Chief of Audits, at (916) 657-0455.

Sincerely,

JEAN SHIOMOTO
Director

STATE OF CALIFORNIA — EDMUND G. BROWN JR., *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

January 22, 2015

Elaine M. Howle, CPA*
California State Auditor
621 Capitol Mall, Suite 1200
Sacramento, CA 95814

RE: Audit 2014- 124 – California's Alternative Energy and Efficiency Initiatives; The California Solar Initiative is Meeting Most Goals, but Several Improvements Are Needed

Dear Ms. Howle,

The California Public Utilities Commission (CPUC) provides the following response to the January 15 draft audit report entitled, "Audit 2014- 124 – California's Alternative Energy and Efficiency Initiatives". Thank you for the opportunity to respond to the draft report.

The primary goals of the California Solar Initiative (CSI), as created by the CPUC and Senate Bill 1 (Murray, 2006)[1], are to install 1,940 megawatts of solar capacity while creating a self-sustaining solar industry that can operate without subsidies. The data presented in the audit shows that these goals have been or will be achieved before the program terminates at the end of 2016. Specifically, we expect to meet the capacity goals ahead of schedule. And, as CSI incentives wane, we continue to see the solar market grow. Key points are that 50% of all new solar systems installed last year were built without the need for CSI incentives, and the installed costs of solar energy systems have declined by over 50% in the past six years.

[1] The CSI Program, codified at § 387.5 and § 2851 of Pub. Util. Code and various code sections of the Public Resources Code, set an overall target of 3,000 MW to be achieved through several program components: the California Solar Initiative, to be carried out by the CPUC and the investor-owned utilities (IOUs); the New Solar Homes Partnership, to be carried out by the California Energy Commission; and the SB1 portion assigned to the publicly owned utilities.

* California State Auditor's comments appear on page 49.

Audit Recommendations (in italics) and Responses:

1. *To make certain that the research program contributes to the goals of the solar initiative the commission should conduct a program evaluation before the remaining grant projects are completed.*

Response: CPUC agrees with this recommendation, and intends to conduct a program evaluation before the program is completed. As stated in the audit report, we have waited to initiate a program evaluation for the CSI Research, Development, Demonstration, and Deployment (RD&D) Program until there is sufficient data to analyze to program's impact. As of today, 19 projects are complete and 18 are active, with 12 of the active projects expected to be completed in 2015. We agree that now that the grant recipients for the final solicitations have been announced and all projects have been launched, it is an optimal time to conduct the program evaluation. The scope of the evaluation can cover completed projects for the majority of grant recipients and would yield results on the program's impact on contributing to the goals of the CSI program. ①

2. *Because the thermal program has not been successful in meeting the goals outlined in state law, the Legislature should consider whether it wants to continue authorizing the collection of ratepayers' money to fund the program.*

Response: CPUC agrees with this recommendation. In January 2014, the Commission made a similar recommendation in a report entitled, "Review of Incentive Levels and Progress of the California Solar Initiative – Thermal Program", provided to the Legislature pursuant to Assembly Bill 2249 (Buchanan, 2012). We concluded that "[a]pproximately four years into the CSI-Thermal Program, underwhelming program participation makes it unlikely to meet the goals the Legislature has set for the program, at the presently-allowed level of funding. Even if the program design options available to the Commission are adopted in full, these steps still may not be sufficient to spur the necessary level of growth needed in program participation. Thus, members of the Legislature should be aware that it may be necessary to alter the program's statutory goals or raise the funding cap in order to make this program a success." That said, we continue to diligently administer the program, including making necessary program changes, and will be committed to do so as long as the program is statutorily mandated.

3. *To show how air pollution emissions reductions related to the solar initiative benefit the State, the commission should include in future reports the measurable benefits of those reductions.*

Response: Prior CSI program evaluation reports have estimated the total quantity (in tons or pounds) of greenhouse gas and air pollutant emissions reductions from the installation of solar photovoltaic systems. The California Air Resources Board (ARB) manages the State's air pollution programs and has specialized expertise to determine whether specific quantities of pollution reduction have had impacts on public health, economic development and/or impacts on the state's attainment of clean air regulations. Implementing this recommendation will require close coordination with ARB and development of a clear methodology to translate emission reductions into benefit calculations supported by both agencies. ②

Sincerely,

Timothy J. Sullivan
Executive Director

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Comments

CALIFORNIA STATE AUDITOR'S COMMENTS ON THE RESPONSE FROM THE CALIFORNIA PUBLIC UTILITIES COMMISSION

To provide clarity and perspective, we are commenting on the California Public Utilities Commission's (commission) response to our audit. The numbers below correspond to the numbers we have placed in the margin of the commission's response.

Although we are pleased that the commission still intends to evaluate the Research, Development, Deployment and Demonstration Program (research program), the commission has not addressed our concern regarding its delay in doing so. As we describe on page 22 of the report, the commission's order that implemented the research program in 2007 stated that the research program would be evaluated every three years. Also on page 22, the commission acknowledges that a program evaluator was never hired because it was waiting until a sizable portion of the grants were completed. As of January 2015—seven years into the program—the commission still had not solicited requests for proposals or taken any other steps toward securing a program evaluator, although by that time the research program had awarded all of its funds. Moreover, in contrast to the commission's response, we did not state that "now that the grant recipients for the final solicitation have been announced and all the projects have been launched, it is an optimal time to conduct the program evaluation." Rather, we stated on page 23 that the commission should have ensured that the evaluations were being done on an ongoing basis, as originally planned. (1)

We agree with the commission that determining how—or even if—the pollution emission reductions linked to the California Solar Initiative (solar initiative) benefit the State will require specialized expertise. Nevertheless, Senate Bill 1 (Chapter 132, Statutes of 2006) indicates that the solar initiative should have pollution reduction benefits. As noted in our report, the commission has used outside consultants in the past for specialized expertise and analysis. Although the commission asserts that it needs the assistance of the California Air Resources Board (Air Resources Board) to translate emission reductions into benefit calculations, the cooperation of the Air Resources Board should not be an impediment to the commission's effort to determine the pollution reduction benefits of the solar initiative. (2)