CALIFORNIA
ENERGY
COMMISSION

2006 RENEWABLE ENERGY INVESTMENT PLAN

COMMITTEE DRAFT REPORT

JANUARY 2006
CEC-300-2006-003-CTD

Arnold Schwarzenegger, *Governor*

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Valerie Hall
Deputy Director
EFFICIENCY, RENEWABLES AND DEMAND ANALYSIS DIVISION

Drake Johnson
Renewable Energy Office Manager

B.B. Blevins
Executive Director

DISCLAIMER

This report was prepared by the California Energy Commission's Renewables Committee as part of the proceeding for the *2006 Renewable Energy Investment Plan*, Docket # 00-REN-1194. The report will be considered for adoption by the full Energy Commission at its Business Meeting on February 1, 2006. The views and recommendations contained in this document are not official policy of the Energy Commission until the report is adopted.

ABSTRACT

California state law requires the California Energy Commission to submit an investment plan to the Legislature on or before March 31, 2006, to recommend an allocation of Renewable Resource Trust Fund money collected between January 1, 2007, and January 1, 2012. The Renewables Committee prepared this Committee Draft report after receiving public comment on the *2006 Renewable Energy Investment Plan, Staff Draft*. The Energy Commission plans to consider the *2006 Renewable Energy Investment Plan, Committee Draft* for adoption on February 1, 2006, and submit the adopted report to the Legislature. This investment plan is based on policy direction provided in the Governor's response to the *2003 Integrated Energy Policy Report* and the *2004 Integrated Energy Policy Report Update*, as well as the policy recommendations in the *2005 Integrated Energy Policy Report*.

KEYWORDS

The key words for purposes of a search on the California Energy Commission Web site (www.energy.ca.gov) are as follows:

biomass, California, distributed generation, fuel cell, geothermal, investment plan, photovoltaic, preferred electricity loading order, renewables portfolio standard, renewable energy, repowered renewable energy, Reliable Electric Service Investments Act, million solar roofs initiative, solar thermal electric, Western Renewable Energy Generation Information System, wind energy

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ACKNOWLEDGEMENTS

This report was prepared with contributions from the following:

Staff Contributors

Bill Blackburn
Pamela Doughman
Lynette Esternon
Tony Goncalves
Gabe Herrera
Mark Hutchison
Drake Johnson
Rasa Keanini
Marija Krapcevich
Madeleine Meade
Melinda Merritt
Jason Orta
Heather Raitt
Brandon Rose
Rachel Salazar
Monica Schwebs
Jeff Wilson
Kate Zocchetti

Support Staff

Tracy Boggs
Debbie Friese
Janet Preis

Technical Assistance Contractors

KEMA, Inc., Contracting Team (Contract no. 500-04-027)

Parties Providing Written Comments, Presentations, or Comments in Workshop held on November 14, 2005

Americans for Solar Power
Bergey Windpower
C. J. Solar
California Biomass Energy Alliance, LLC
California Wind Energy Association
Calpine Corporation
ConSol
Energy Options
Golden Sierra Power, Inc.
Independent Energy Producers Association
League of Women Voters
Pacific Gas and Electric Company
S.O.L.I.D. USA, Inc.
San Diego Gas & Electric
Seawest WindPower
Southern California Edison
Southwest Windpower
Sunray Energy, Inc.
The Utility Reform Network
Union of Concerned Scientists
Vulcan Power

EXECUTIVE SUMMARY

This *2006 Renewable Energy Investment Plan, Committee Draft* (*2006 Investment Plan*) recommends an allocation of funds collected from January 1, 2007, to January 1, 2012, as required by SB 1194 (Sher), Chapter 1050, Statutes of 2000, and AB 995 (Wright), Chapter 1051, Statutes of 2000. These funds will be collected from January 1, 2007, to January 1, 2012, pursuant to the Reliable Electric Service Investments Act. Legislation is needed to authorize use of these funds. The recommended allocation of funds is based on policy direction from the Governor, as stated in the Governor's response to the California Energy Commission's (Energy Commission) *2003 Integrated Energy Policy Report* and the *2004 Integrated Energy Policy Report Update.* In addition, the allocation of funds reflects the policy recommendations in the Energy Commission's *2005 Integrated Energy Policy Report (2005 Energy Report),* recent payment histories from each of the program elements of the Renewable Energy Program, and staff analysis.

The Energy Commission's Renewables Committee held a public workshop on November 14, 2005, to seek public comment on the staff draft *2006 Investment Plan*.[1] Public comment was considered in preparing the *2006 Investment Plan, Committee Draft*. The Committee expects the *2006 Investment Plan, Committee Draft* to be considered for adoption by the Energy Commission at its business meeting on February 1, 2006. The *2006 Investment Plan* is due to the Legislature on or before March 31, 2006.

Policy Direction from the Governor and the Integrated Energy Policy Reports

Efficiency and the use of renewable resources are top priorities in California's loading order policy for electricity. The Renewables Portfolio Standard (RPS) program, accelerated to reach 20 percent of retail sales from renewable energy by 2010 statewide, is central to meeting California's renewable resource goals. However, the *2005 Energy Report* states that the current process for procuring renewable resources is overly complex, delaying the state's ability to achieve its renewable energy goals. To address these problems, the *2005 Energy Report* recommends the California Public Utility Commission (CPUC) and the Energy Commission make the following changes to the investor-owned utility (IOU) RPS Program:

- The RPS program is in need of a mid-course review and correction. After completion of the 2005 round of IOU solicitations, the CPUC and the Energy Commission should investigate whether a simpler and more transparent RPS process would better achieve the state's 2010 goals. A seminal question is the likely impact of the CPUC's "rebuttable presumption" for renewables

directive for IOU all-source procurement. This review should be completed and transmitted to the Governor and Legislature by January 1, 2007.

- The CPUC should allow for changes to the current program that can be accomplished under existing RPS law, including inter-utility trades under flexible compliance, the use of shaped products, and more flexible delivery requirements, as well as changes to transmission cost adders….[2]

Any changes to the RPS program should reflect the Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update*, which stated:

> California's regulations should provide equivalent incentives for all environmentally attractive new renewable energy but let competitive forces determine which of these are most economically attractive.[3]

The Western Renewable Energy Generation Information System is a critical component of RPS implementation, including out-of-state participation. This system will support verification, tracking, and transferring of renewable energy certificates representing renewable energy generation in the Western Electricity Coordinating Council. It will be used with North American Electricity Reliability Council tags to verify energy delivery to California or the California Independent System Operator control area from out-of-state facilities. The Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update* encourages the Legislature "to enable a tradable credit or other system to encourage development of the vast renewable resources available throughout the West."[4]

For emerging renewables, the Governor set a goal of 1 million solar roofs or the equivalent of 3,000 megawatts by 2018. During the 2006-2006 Legislative session, the Governor supported SB 1 (Murray), also known as the Million Solar Roofs Initiative, to provide the foundation for achieving this goal. In support of the Governor's goal for distributed generation solar energy, the CPUC adopted the California Solar Initiative on January 12, 2006, which aims to accomplish the Governor's goals under existing statutory authority if pending legislation does not become law.

Building on previous *Energy Reports*, the *2005 Energy Report* recommends the following principles for developing the photovoltaic (PV) market in California:

> The principles outlined in the 2004 Energy Report Update for a successful and rational PV program still apply today. Achieving the scale proposed by the Governor requires a broad program that includes all residential and commercial buildings, whether existing or new. Also, because leveraging energy efficiency improvements should be a key consideration in deploying PV, new homes should be required to exceed current building [energy] efficiency standards, while existing buildings should be required to improve their [energy] efficiency by a fixed percentage. Similarly, PV installations

> should be linked to dynamic pricing tariffs and advanced metering to use solar systems to meet peak load, thereby lowering electric system costs and rates. Further, to provide the most benefit, solar installations should be targeted to climate zones with high peak demands for air conditioning.
>
> A sound solar program should also include consistent, long-term declining incentives to provide the volume of sales and commitment needed to bring manufacturing and other costs down. The failure of the state's PV incentive programs to bring costs down, and the severe oversubscription in those programs, indicates that up-front rebates may not be the most efficient use of public funds to achieve the goal of a sustainable solar industry. Instead, as articulated in the *2004 Energy Report Update*, the state should transition to performance-based incentives to promote more cost-effective public funding in terms of long-term energy generation per dollar of incentive support. A truly sustainable solar program will pay for kWhs [(kilowatt-hours)] produced rather than for system installation with no measure of performance to ensure that systems are appropriately installed and functioning correctly.[5]
>
> Also, the Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update* directed the state to "include agricultural applications in the mix of home and business applications of solar power that the state encourages."[6] In addition, AB 515 (Richman), Chapter 368, Statutes of 2005, provides further support for solar energy development by promoting the installation of PV generation in open spaces above and along 660 miles of open canals and pipelines on the State Water Project.[7]

Regarding existing and new facilities generating energy from solid biomass, the Governor stated that he expects the following statement to be used as the basis for developing energy-related policy:

> I support the Biomass Collaborative and its potential for contributing to the diversity of energy resources and have reinvigorated the Interagency Working Group, composed of state agencies with important biomass connections, to develop an integrated and comprehensive state policy on biomass. This policy should include electricity, natural gas, and petroleum substitution potential. It should also reflect the substantial potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. The Energy Commission's Public Interest Energy Research program should support this initiative.[8]

Recommended Allocation of Funds for the Renewable Energy Program

In support of these renewable energy goals and policy priorities, the Energy Commission's Renewables Committee recommends the following allocation of funds

collected between January 1, 2007, and January 1, 2012, pursuant to the Reliable Electric Service Investments Act.[9]

- New Renewable Facilities Program – 38 percent ($285 million) to be added to $347.63 million still available from SB 1038 for production incentives or supplemental energy payments for energy generated from new renewable power plants that come online or are repowered after the date legislation is enacted to reauthorize the Energy Commission's Renewable Energy Program. After weighing public information on contracts signed to date without the need for supplemental energy payments, rollover of SB 1038 supplemental energy payment funds ($347.63 million), the high cost of natural gas, and uncertainty regarding above market costs of the RPS for 2005-2009, we recommend reducing the amount set aside for above-market RPS costs and increasing the flexibility to reallocate funds as needed to address changing market conditions. Current law for the Renewable Energy Program allows the Energy Commission to transfer money into the New Renewable Facilities Program element, but funds may not be transferred out of this element to serve the needs of other Renewable Energy Program elements. We recommend a legislative change to drop this constraint to allow maximum flexibility to reallocate funds to achieve the state's renewable energy goals.

- Emerging Renewables – 48 percent ($360 million) for incentives to support the Governor's Million Solar Roofs Initiative or California Solar Initiative to reach 3,000 megawatts of distributed solar energy in the next 10 years. This amount includes money to repay the $60 million borrowed from future collection of Renewable Energy Program funds, pursuant to AB 135 (Reyes), Chapter 867, Statutes of 2004. It also provides $300 million in support of the California Solar Initiative and other currently eligible non-solar emerging renewable technologies. In addition, the Committee recommends that the Legislature define the parameters for eligibility of metered, renewable-fueled, electricity-displacing active heating, ventilation, and air conditioning systems in the Emerging Renewables Program, while recognizing the intent of the program to move to performance-based incentives. By displacing on-peak electricity for air conditioning, these systems help lower electric system costs and rates.

- Existing Renewables – 10 percent ($75 million) for production incentives for existing solid-fuel biomass facilities and solar thermal electric facilities. This recommendation is based on payments from the Existing Renewable Facilities Program element over the past two years, the need for some continued support for existing central-station solar thermal electric facilities, estimates of the levelized cost of energy for solid-fuel biomass, the availability of the federal production tax credit to solid-fuel biomass, and the availability of capacity payments supporting operation of solid-fuel biomass facilities during summer peak and partial peak hours.

- Consumer Education – 4 percent ($30 million) for consumer information, outreach, and marketing efforts, including the Western Renewable Energy Generation Information System, recognizing that energy delivery from out-of-state facilities will be verified through the use of North American Electricity Reliability Council tags. Initially, most of the funds will be used in support of the Governor's Million Solar Roofs Initiative or California Solar Initiative.

Tables ES-1 and ES-2 summarize the proposed allocation of funding. Table ES-1 shows funding as a percent of the total compared to allocations under SB 90 (Sher), Chapter 905, Statutes of 1997, and SB 1038 (Sher), Chapter 515, Statutes of 2002.

Table ES-1. Recommended Renewable Energy Program Funding Allocations January 1, 2007 – January 1, 2012 (percent)

	SB 90 1998-2001	SB 1038 2002-2007	SB 1038 2002-2007 reallocation of customer credit	Proposed 2007-2012
New Renewable Facilities	30%	51.5%	51.5%	38%
Emerging Renewables	10%	17.5%	26.5%	48%
Consumer Education*	1%	1%	2%	4%
Customer Credit	14%	10%	0%	0%
Existing Renewables	45%	20%	20%	10%
Total	100%	100%	100%	100%

Source: SB 90 (Sher), Chapter 905, Statutes of 1997, SB 1038 (Sher), Chapter 515, Statutes of 2002, *2006 Renewable Energy Investment Plan.*
*See text for proposed name change for this program.

Table ES-2. Recommended Renewable Energy Program Funding Allocations January 1, 2007 – January 1, 2012 ($ million)

	SB 1038 2002-2007 excluding interest ($ million)	Amount spent in FY 2004-2005 ($ million)	Proposed 2007-2011 excluding interest and roll over funds ($ million)
New Renewable Facilities	$347.63	$10.70	$285
Emerging Renewables	$118.12	$55.90	$360
Consumer Education*	$6.75	$0.19	$30
Customer Credit	$67.50	$0.00	$0
Existing Renewables	$135.00	$18.30	$75
Total	$675.00	$85.09	$750

Source: SB 1038 (Sher), Chapter 515, Statutes of 2002, California Energy Commission, November 2005, *2005 Annual Report to the Legislature, Committee Report*, *2006 Renewable Energy Investment Plan*.
*See text for proposed name change for this program.

The proposed allocation of funds for 2007-2012 removes the Customer Credit Program, which was discontinued in 2003, and allocates those funds to the Emerging Renewables Program element of the Renewable Energy Program to support the Governor's Million Solar Roofs Initiative or California Solar Initiative. We also propose shifting some funds from the New Renewable Facilities Program and the Existing Renewable Facilities Program element into the Emerging Renewables Program. In addition, we propose allocating a portion of funds from the New Renewable Facilities Program to the Consumer Education Program.

Table ES-2 shows the dollar amount allocated by SB 1038, excluding interest. It also shows the amount paid or encumbered in fiscal year 2004-2005 and the amount proposed for funds collected between January 1, 2007, through January 1, 2011, excluding interest and rollover funds.[10] This is based on the assumption that $750 million will be collected during the five years addressed by this investment plan, averaging $150 million per year. The amount collected for the Renewable Energy Program in 2005 is projected to be about $140 million. We escalated this amount by about 1.5 percent per year. If the lesser of annual growth in electric commodity sales or inflation is below this rate on average, a smaller amount of funding will be available.

The Committee recommends that any remaining funds available at the close of 2006 should be rolled over into money available for expenditure between January 1, 2007, and January 1, 2012. Money should roll over as follows: New Renewable Facilities Program funds should remain in the New Renewable Facilities Program; Consumer Education Program funds should remain in the Consumer Education Program; Existing Renewable Facilities Program funds should remain in this program, except funds originally allocated for existing wind energy (Tier 2). These funds should be rolled into the Emerging Renewables Program. Any remaining Emerging Renewables Program funds will stay in the Emerging Renewables Program.

In addition, the Committee recommends changing the name of the Consumer Education Program to the Consumer Information and Market Support Program.

Continued Flexibility to Adjust to Market Conditions

The Energy Commission and the renewable energy market have benefited from the flexibility to reallocate funds through the Energy Commission's guidebook process built into SB 90, although this flexibility was reduced somewhat in SB 1038.[11] The flexibility provided in SB 90 allowed the Renewable Energy Program to maximize the benefits of Renewable Resource Trust Fund money, as recognized by the California State Auditor, Bureau of State Auditors, in its May 2001 *Energy Deregulation* report.[12]

SB 1038 restricts reallocation of funds from the New Renewable Facilities Program element to any of the other Renewable Energy Program elements supported by the

Renewable Resource Trust Fund. SB 1038 also restricts reallocation of funds from other Renewable Energy Program elements into the Existing Renewable Facilities Program. To provide maximum flexibility to adjust to changing market conditions, we recommend a legislative change to remove these restrictions.

For January 1, 2007, to January 1, 2012, we recommend that program eligibility criteria, distribution methods, and reallocation of funds continue to be developed through guidelines. The guidelines may be periodically revised with public input to allow rapid response to changes in the market, make any needed mid-course corrections, and avoid inefficiency.

We will continue to report reallocation decisions in the annual report to the Legislature, as required by AB 2304 (Richman), Chapter 781, Statutes of 2004.

Executive Summary Endnotes

[1] The workshop began at 9:00 am in Hearing Room A at the Energy Commission, located at 1516 Ninth Street in Sacramento. Audio from the workshop was Webcast at www.energy.ca.gov/webcast. For additional information, see http://www.energy.ca.gov/renewables/index.html.

[2] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/, accessed December 6, 2005, p. 112.

[3] Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005.

[4] California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 6.

[5] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/, accessed December 6, 2005, p. 125.

[6] California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 5.

[7] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/, accessed December 6, 2005, p. 125.

[8] California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 14.

[9] Established by SB 1194 (Sher) and AB 995 (Wright) and codified in Public Utilities Code section 399, et seq.

[10] For further information regarding payment and encumbrances in support of Renewable Energy in fiscal year 2004-2005, see California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, http://www.energy.ca.gov/renewables/quarterly_updates/, November 2005.

[11] SB 90 (Sher), Chapter 905, Statutes of 1997, as previously codified in Public Utilities Code section 383.5(g). SB 1038 (Sher), Chapter 515, Statutes of 2002, as previously codified in Public Utilities Code section 383.5(i), and currently codified in Public Resources Code section 25748(b) pursuant to SB 183 (Sher), Chapter 666, Statutes of 2003.

[12] California State Auditor, Bureau of State Audits, May 2001, *Energy Deregulation,* 2000-134.2, http://www.bsa.ca.gov/pdfs/reports/2000-134.2.pdf, accessed October 18, 2005, pp. 48-49.

CHAPTER 1: INTRODUCTION

The Energy Commission's Renewable Energy Program began in 1998 to help increase the amount of renewable electricity used to meet California's growing demand. This program is based on decades of bipartisan legislative and gubernatorial support for renewable energy that have helped to make California a recognized leader in the field.

The Renewable Energy Program provides market-based incentives for new and existing utility-scale electricity-generating facilities powered by renewable energy resources. In addition, it offers consumer rebates for installing new grid-connected, distributed generation (DG) renewable energy systems. The program also provides training workshops and information on distributed generation photovoltaic systems for industry, local government, and individuals; tracks renewable energy generation and delivery; and helps inform the public on the purchase, installation, and available incentives for renewable energy.

Legislative Requirements

AB 995 (Wright), Chapter 1051, Statutes of 2000, and SB 1194 (Sher), Chapter 1050, Statutes of 2000, enacted on September 30, 2000, created the Reliable Electric Service Investments Act (RESIA) and extended the collection of a non-bypassable system benefit charge established under AB 1890 (Brulte), Chapter 854, Statutes of 1996, in September 1996 and distributed pursuant to SB 90 (Sher), Chapter 905, Statutes of 1997, starting in January 1998.

The RESIA requires the Energy Commission to submit two investment plans for the Legislature's consideration. The first investment plan, *Investing in Renewable Energy Generation in California* (2001), addressed allocation of funds collected from January 1, 2002, to January 1, 2007, and was incorporated into SB 1038 (Sher), Chapter 515, Statutes of 2002.

This *2006 Renewable Energy Investment Plan, Committee Draft* (*2006 Investment Plan*) recommends an allocation of funds collected from January 1, 2007, to January 1, 2012. Legislation is needed to authorize use of these funds. The allocation is based on the policy direction provided in the Governor's response to the *2003 Integrated Energy Policy Report* (*2003 Energy Report*) and the *2004 Integrated Energy Policy Report Update (2004 Energy Report Update),* as well as the policy recommendations in the *2005 Integrated Energy Policy Report, Commission Final Report (2005 Energy Report)* and staff and technical support contractor analysis.

Pursuant to the RESIA, each investment plan must support the long-term goal of a fully competitive and self-sustaining California renewable energy supply. The

investment plan's objective shall be to increase, in the near term, the quantity of California's electricity generated by in-state renewable energy resources, while protecting system reliability, fostering resource diversity, and obtaining the greatest environmental benefits for California residents. In addition, the plan shall identify and support emerging renewable energy technologies that have the greatest near-term commercial promise and merit targeted assistance.

Each investment plan shall also contain specific numerical targets reflecting the projected impact of the plan for increased quantity of renewable generation both overall and from emerging technologies, as well as the increased supply of renewable generation available from facilities not under utility contracts entered into prior to 1996.

In particular, the RESIA states that each investment plan shall recommend funding allocations among the following:

1. Production incentives for new renewable energy, including repowered or refurbished renewable energy facilities.

2. Rebates, buy downs, or equivalent incentives for emerging renewable technologies.

3. Customer credits for renewables not under contract with a utility.[13]

4. Customer education.

5. Incentives for reducing fuel costs that are confirmed to the satisfaction of the Energy Commission at solid fuel biomass energy facilities in order to provide demonstrable environmental and public benefits, including, but not limited to, air quality.

6. Solar thermal generating resources that enhance the environmental value or reliability of the electricity system and that require financial assistance to remain economically viable, as determined by the Energy Commission.

7. Specified fuel cell technologies, if the Energy Commission makes all of the following findings:

    - The specified technologies have similar or better air pollutant characteristics than renewable technologies in the investment plan.
    - The specified technologies require financial assistance to become commercially viable by reference to wholesale generation prices.
    - The specified technologies could contribute significantly to the infrastructure development or other innovation required to meet the long-term objective of a self-sustaining, competitive supply of renewable energy.

8. Existing wind-generating resources, if the Energy Commission finds that the existing wind-generating resources are a cost-effective source of reliability and environmental benefits compared with other eligible sources, and that the existing wind-generating resources require financial assistance to remain economically viable, as determined by the Energy Commission.

Legislative History

- AB 1890 established the collection of funds from utility ratepayers through a non-bypassable system benefit charge to support existing, new, and emerging renewable resources and directed the Energy Commission to prepare an investment plan to distribute these funds.

- SB 90 subsequently authorized the Energy Commission to establish the Renewable Energy Program to distribute funds collected under AB 1890 and directed the distribution of these funds consistent with the Energy Commission's 1997 renewable energy investment plan.

- AB 995 and SB 1194 extended the collection of the system benefit charge.

- SB 1038 authorized the Energy Commission to use funds collected pursuant to AB 995 and SB 1194 for the continued administration and support of the Renewable Energy Program from 2002 through 2006, and directed the distribution of these funds consistent with the Energy Commission's 2001 renewable energy investment plan.

- SB 1078 (Sher), Chapter 516, Statutes of 2002, created the state's RPS and requires the Energy Commission to take certain action, including establishing a program to provide incentives to cover above-market costs for new or repowered renewable power plants in support of the RPS.

- SB 183 (Sher), Chapter 666, Statutes of 2003, amended and recast the provisions of Public Utilities Code sections 383.5 and 445 governing the Renewable Energy Program into Public Resources Code sections 25740 through 25751.

- SB 67 (Bowen), Chapter 731, Statutes of 2003, modified the eligibility requirements for renewable generators located out of state.

- SB 168 (Bowen), Chapter 733, Statutes of 2003, made technical amendments to Public Utilities Code sections 383.5 and 445, which were chaptered out because SB 183 recast those provisions into the Public Resources Code.

- AB 135 (Reyes), Chapter 867, Statutes of 2004, authorized the Energy Commission to immediately use up to $60 million of the funds in the Renewable Resource Trust Fund (RRTF) to support the Emerging Renewables Program (ERP) element of the Renewable Energy Program. These funds may only be expended until December 31, 2008, and are subject to the repayment requirements of Public Resources Code section 25751, subdivision (f).

- AB 200 (Leslie), Chapter 50, Statutes of 2005, modified the eligibility requirements for renewable generators located out of state serving the load of utilities such as Sierra Pacific and PacifiCorp that have a limited number of customers in California.

Status of Renewable Energy in California

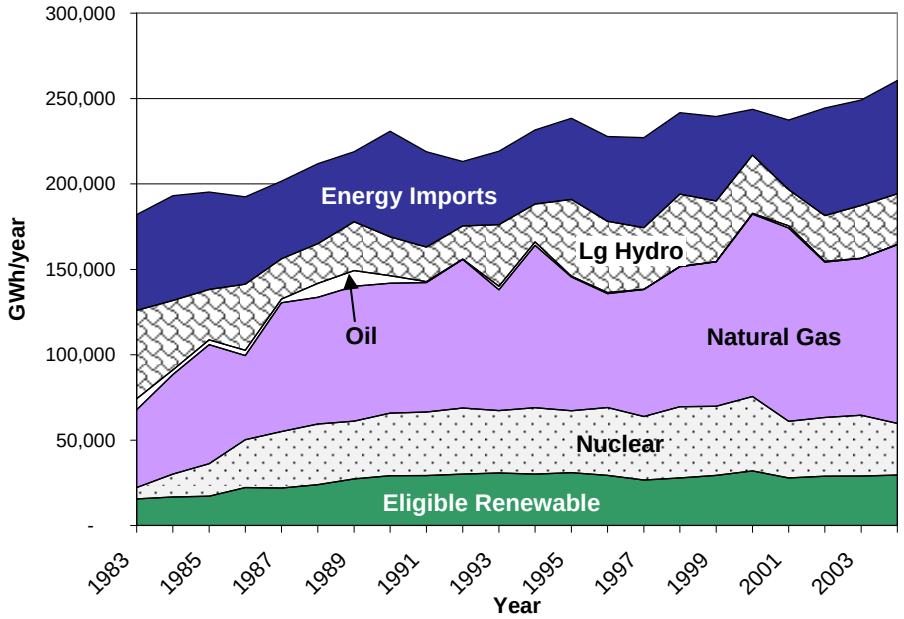
The Renewable Energy Program provides incentives for investment in renewable energy to meet load in IOU, electric service provider (ESP), and community choice aggregator (CCA) service areas. To meet statewide goals, publicly owned utilities (POUs), such as the Los Angeles Department of Water and Power (LADWP) and the Sacramento Municipal Utility District (SMUD), also need to substantially increase their procurement of renewable energy.

Under SB 1078, the state's RPS goal is to reach 20 percent renewables by 2017 statewide. The CPUC and the Energy Commission are working to accelerate the goal to 20 percent by 2010. However, the *2005 Energy Report* states we are losing ground:

> Applying consistent statewide RPS rules to POUs will require legislative action. The need to bring POUs into the RPS is underscored by data indicating that the volume of renewables in California's electricity mix has actually dropped since 2002, from 11 percent to 10.2 percent statewide. Based on data submitted by IOUs on their progress toward RPS compliance, the shortfall appears to be from non-IOU retail sellers such as POUs and ESPs. Although a number of POUs already report more than 20 percent eligible renewables, in 2003 the state's largest POUs, LADWP and SMUD, reported only 2 percent and 9 percent renewables, respectively, although the newly elected mayor of Los Angeles recently committed to reaching 20 percent by 2010.[14]

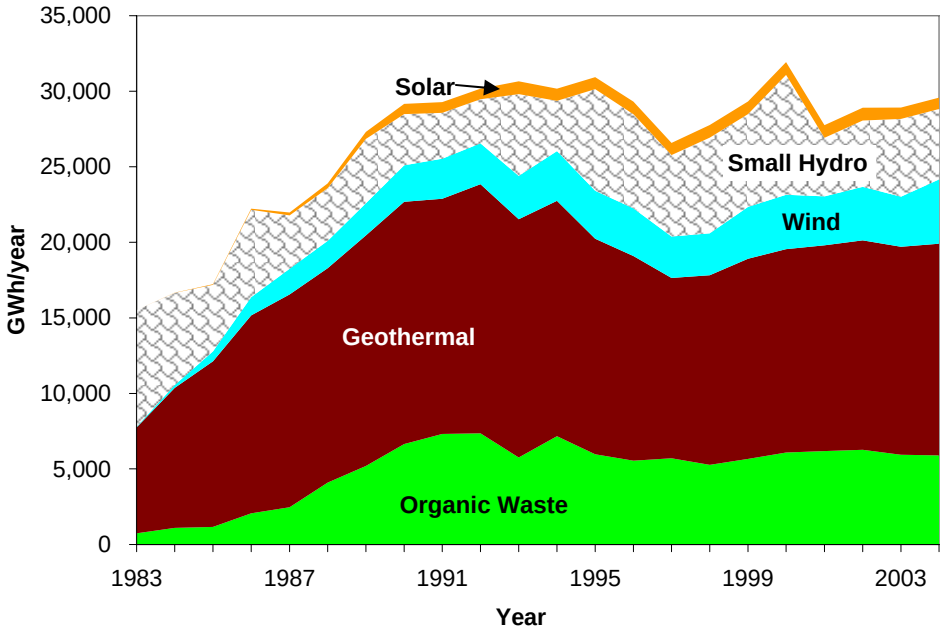
As shown in Figure 1 and Figure 2, although the amount of electricity from renewable resources has increased, the amount of electricity from other resources has increased by a greater amount, causing the proportion of electricity used to meet California load from renewable resources to decline in recent years.

Figure 1. California Electricity Generation 1983-2004



Source: California Energy Commission, 1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel), http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS.[15]

Figure 2. California Renewable Electricity Generation by Resource Type 1983-2004

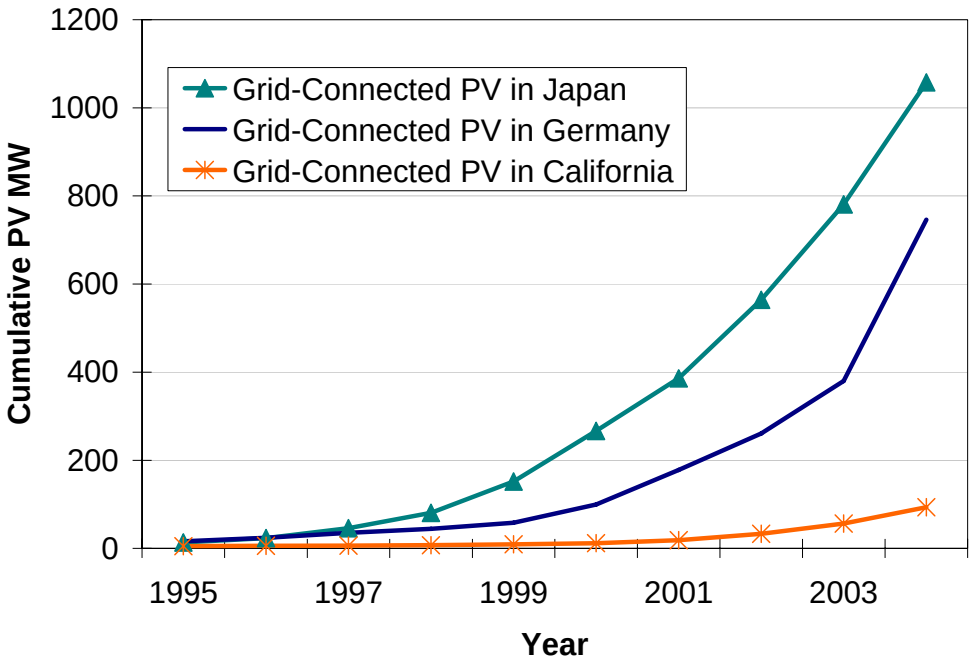


Source: California Energy Commission, 1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel), http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS. The amount shown for small hydro is an estimate prepared by Energy Commission staff, with data for recent years from the Energy Commission's net system power reports.[16]

The contribution from renewable energy relative to other sources of California electricity generation is shown in Figure 1. As shown in Figure 2, geothermal provides the largest amount of California's eligible renewable energy generation, followed by biomass. Third is small hydro, followed by wind and concentrating solar power. Renewable energy generation from geothermal, biomass, concentrating solar power, and wind in California has increased from about 7,800 gigawatt-hours (GWh) in 1983 to about 24,900 GWh in 2004. The Energy Commission staff estimates that generation from small hydroelectric power (hydro) has fluctuated between 2,900 GWh and 7,900 GWh, depending on precipitation.[17] The revised Gross System Power data indicate that eligible renewable energy provided 29,571 GWh of electricity generation. Of all generation used to meet California electricity load in 2004, geothermal provided about 4.8 percent, biomass provided 2.0 percent, 1.6 percent came from small hydro, 1.5 percent from wind, and 0.3 percent from concentrating solar power.[18]

In addition, the cumulative amount of grid-connected, DG photovoltaic (PV) systems in California continues to grow, supported by programs at the Energy Commission, the CPUC, and many POUs (Figure 3).

Figure 3. Cumulative Grid-Connected Photovoltaic Capacity in Japan, Germany, and California (1995-2004)



Source: International Energy Agency Photovoltaic Power Systems Programme, Annual Report 2004, http://www.oja-services.nl/iea-pvps/ar04/index.htm. Solarbuzz, March 14, 2005, 2004 World PV Market Report Highlights, http://www.solarbuzz.com/Marketbuzz2005-intro.htm, California Energy Commission, March 31, 2005, "Amount (MW) of Grid-Connected Solar Photovoltaics (PV) in California, 1981 to Present," http://www.energy.ca.gov/renewables/emerging_renewables/GRID-CONNECTED_PV.PDF.

At the end of 2004, California was close to reaching 100 megawatts (MW) of installed DG PV systems. Compared to the cumulative installed capacity in Japan and Germany, however, California is a distant third among the largest PV markets in the world (Figure 3).

Status of Renewable Resource Trust Fund

From the Renewable Energy Program's creation in 1998 through June 2005, the Energy Commission disbursed a cumulative total of $546 million. More than $229 million is encumbered for projects in progress, with more than $111 million in reserve to meet statutory requirements (Table 1).[19] The following summarizes cumulative funds disbursed by program and market support accomplishments through June 2005:

- The Existing Renewable Facilities Program (ERFP) has helped 275 existing renewable facilities (representing 4,400 MW of renewables capacity) remain competitive or return to service with more than $209 million in funding.

- More than $49 million has been disbursed to 45 projects from the New Renewable Facilities Program (NRFP), with more than $140 million encumbered for participating auction winners. Of the 69 active projects that won funding awards, 47 projects are online, representing 488 MW of capacity. When completed, winning projects from the NRFP auctions are expected to bring 1,265 MW of renewables capacity to California's electricity grid. We anticipate many thousands more MW coming online over the next several years as the RPS program matures.

- Distributed PV and wind energy systems installed on more than 13,800 homes and businesses are providing nearly 56 MW of distributed capacity, with more than 31 MW in various stages of construction. The ERP has provided rebates totaling $210 million with an additional $78 million encumbered for more than 5,000 additional systems. The Solar Schools Program, conducted under the ERP, awarded all of its available funding of $4.5 million to 33 public and charter schools for the installation of PV systems, representing a total of 732 kilowatts (kW).

- Among customers who entered into direct access contracts with alternative providers, nearly all purchased renewable electricity products and received customer credits. The Customer Credit Program supported more than 200,000 customer purchases of renewable electricity, with funds totaling more than $65 million. The Customer Credit Program was discontinued in 2003 as a result of the CPUC's decision to limit direct access.

- Consumers statewide have received information about renewable energy and its benefits via public service announcements, events, radio and television, newspaper, magazine articles, and informational materials. The Consumer Education Program, to be renamed the Consumer Information and Market Support Program, has provided funds totaling more than $5 million for 20 outreach and demonstration project grants, two consumer education contracts, and one currently active grant project.

The Energy Commission is authorized to reallocate funds in the RRTF among programs in a manner consistent with Public Resources Code section 25748(b), which states,

> "Money may be reallocated without further legislative action among existing, new, and emerging technologies and consumer-side programs in a manner consistent with the report [*Investing in Renewable Electricity Generation in California (Investment Plan)*] and with the latest [*Quarterly Report,* April through June 2004] report provided to the Legislature…"

According to Public Resources Code section 25748(b), reallocations may not reduce the allocation for the NRFP nor increase the allocation established for the ERFP. As discussed below, we recommend lifting the restrictions regarding the NRFP and ERFP to allow the Energy Commission to move funds to or from these program elements to other elements of the Renewable Energy Program if needed.

We recommend that any funds remaining in the Renewable Energy Program available at the close of 2006 should be rolled over into money available for expenditure between January 1, 2007, and January 1, 2012. Money should roll over as follows: NRFP funds should remain in the NRFP; Consumer Education Program funds should remain in the Consumer Education Program; ERFP funds should remain in the ERFP, except funds originally allocated for existing wind energy (Tier 2). These funds should be rolled into the ERP. Any remaining ERP funds will remain in the ERP. We recommend that the Consumer Education Program be renamed the Consumer Information and Market Support Program.

Table 1 - Renewable Resource Trust Fund
Cumulative Funding and Expenditures as of June 30, 2005
($ Millions)[20]

	New Renewable Facilities Program[1]	Existing Renewable Facilities Program[2]	Emerging Renewables Program[3]	Customer Credit Program	Consumer Education*	PROGRAM TOTAL
Collected Funds[4]	$408.711	$338.890	$180.928	$75.639	$14.980	$1,019.148
Disbursements	-49.944	-215.366	-210.714	-65.323	-5.068	-546.415
Intrafund Reallocations[5]	**33.800**	**-83.000**	**77.892**	**-10.000**	**0.000**	**18.692**
Encumbrances	-140.068	0.000	-80.895	0.000	-8.533	-229.495
Intrafund Transfer[6]	-60.000		60.000			0.000
Program Balance	192.499	40.524	27.212	0.316	1.379	261.930
Loan Balance[7]						-150.000
RRTF Balance						$111.930

Source: California Energy Commission, Renewable Energy Program, November 2005, *2005 Annual Report to the Legislature, Committee Report*, www.energy.ca.gov/renewables/quarterly_updates/.
* We recommend changing the name of this program element to Consumer Information and Market Support.

Numerical Targets for Funds Collected 2007-2011

Public Utilities Code 399.6(a)(3) calls for the investment plan to contain specific numerical targets for increased generation from emerging renewable technologies, overall renewable resources, and the increased supply of renewable generation available from facilities not under utility contracts entered into prior to 1996.

A number of variables affect the development and continuing operation of renewable electricity facilities beyond the incentives offered through the Renewable Energy Program. Technological changes, conventional generation prices, market structure, general economic growth, consumer attitudes, and habitual standard business practices are variables outside the immediate influence of the program. For example, if natural gas prices remain high and are reasonably projected to remain high for some time, existing, emerging, and new renewable generation will tend to fare better in the market. The incentives in the investment plan can help these resources take advantage of the favorable market conditions, but it may be difficult to separate the effect of the conditions from the influence of the program.

However, if natural gas prices drop back to historic levels, the some renewable technologies may face challenges in developing and maintaining generation under such adverse conditions even with incentives. In that case, the program incentives could be ineffective, and targets consequently difficult to achieve.

It is challenging to design targets that reflect this uncertainty. Targets designed assuming adverse market conditions may seem low if beneficial market conditions for electricity generated by renewable resources prevail. On the other hand, targets designed assuming beneficial market conditions may seem too aggressive if market conditions are adverse. With this uncertainty in mind, we recommend the following numerical targets for renewable energy receiving support from Renewable Energy Program funds rolled over or collected between January 1, 2007, and January 1, 2012:

- For emerging renewable technologies, the numerical target is 400 MW of new construction residential PV and other eligible emerging technologies, supported with funds collected 2007-2011. Incentives for eligible solar technologies will be utilized to support the Governor's Million Solar Roofs Initiative.

- Many of the existing renewable resources no longer require assistance to remain operational. Of the 4,400 MW that have received support from the ERFP in the past, about 950 MW are expected to be eligible to receive support during the period addressed by this investment plan. Of this amount, approximately 850 MW is expected to be from facilities selling to IOUs under contracts entered into prior to 1996 under the federal Public Utilities Regulatory Policies Act of 1978 (P.L. 95-617).

- The numerical target for new renewable resources is between 500 MW and 1,800 MW supported by $347.63 million rolled over from SB 1038 supplemental energy payment (SEP) allocations and $285 million from funds collected between January 1, 2007, and January 1, 2012, totaling about $633 million. These targets are based on the scenarios discussed in Chapter 2, which vary the SEP level for future RPS contracts and success rate of RPS contracts signed by November 2005 without SEPs. The scenarios identify potential IOU SEP requests resulting from RPS Request for Offers held between 2005 and 2009 to achieve 20 percent renewables by 2010:

    1. If SEP payments over 10 years are 1.5 cent/kWh and all IOU RPS renewable resources contracted but not yet operational (about 3,030 MW) come online, the proposed allocation could support about 530 MW of geothermal facilities or 600 MW of solid-fuel biomass.

    2. If SEP payments over 10 years are 1 cent/kWh and the minimum amount of currently contracted resources (about 1,700 MW) come online, the

$633 million could support about 790 MW of geothermal or 890 MW of solid-fuel biomass facilities.

However, 800 MW of the 1,700 MW minimum contracted amount is from a type of concentrating solar power technology that has not yet been used on a commercial scale. If this amount fails to become operational, more energy will be needed to meet the IOU RPS goal of 20 percent renewables by 2010. If SEPs are 1 cent/kWh, the gap would need to be filled by renewable resources without SEP support.

3. If the SEP level is one-half cent/kWh and none of the amount of contracted RPS resources beyond those delivering energy in 2004 become operational, the $633 million could support about 1,600 MW of geothermal or 1,800 MW of solid biomass.

- The target for overall renewable resource supported with the proposed allocations is 1,900 MW to 3,200 MW. This includes support for 950 MW of existing renewables beginning operation before 1996, 400 MW for emerging renewables, and between about 500 MW and 1,800 MW, of new renewable facilities, depending on market conditions, the price of natural gas, and the success rate of RPS contracts signed but not yet operational before 2006. This represents support for about 5 percent to 11 percent of estimated 2010 IOU retail electricity sales, supplementing the existing and new renewable energy expected to be operational without incentives from this program.

Investment Plan Development Process

The Energy Commission's experience developing recommendations and administering the RRTF since 1998 has been an important foundation for this investment plan, including ongoing re-evaluation of market conditions and implementation strategies.

In July 2005, the Energy Commission published *Implementing California's Loading Order for Electricity Resources – Staff Report* in support of the *2005 Integrated Energy Policy Report* proceeding.[21] In Chapter 5, the report discusses the trends and outlook for renewable energy development, including a series of questions for public comment on the future direction of renewable energy programs in California. The questions were discussed at a public workshop on July 25, 2005. The staff report and subsequent public comments were considered by the Energy Commission's Integrated Energy Policy Report Committee in preparing the *2005 Energy Report, Committee Draft*, published in September 2005, and discussed at a series of public hearings held in September and October. The Energy Commission adopted the *2005 Energy Report, Commission Final* in November 2005.

On August 23, 2005, Governor Schwarzenegger provided policy direction to state agencies in his review of the *2003 Energy Report* and *2004 Energy Report Update*. The Governor concluded that,

> The Energy Report is, as I have modified its assessments and recommendations pursuant to Public Resources Code 25307(a-b), a sound basis for energy policy analysis and development, going forward. I expect all state agencies to use it as the common foundation for making their energy-related decisions. Other state agencies are also encouraged to use the modified Energy Report as a basis for their energy-related decisions.[22]

Accordingly, this *2006 Investment Plan, Committee Draft* uses the *2003 Energy Report* and *2004 Energy Report Update,* as modified by the Governor's review, and the *2005 Energy Report* as the basis for the recommended allocation of renewable energy program funds collected between January 1, 2007, and January 1, 2012.

The Energy Commission's Renewables Committee (Committee) held a public workshop on November 14, 2005, to seek public comment on the Staff Draft *2006 Investment Plan*. The Committee considered public comments in preparing the *2006 Investment Plan, Committee Draft*. The Committee expects the *2006 Investment Plan, Committee Draft* to be considered for adoption by the Energy Commission at its February 1, 2006, business meeting. The *2006 Investment Plan* is due to the Legislature on or before March 31, 2006.

Key Assumptions and Definitions

Estimated Amount Collected Annually 2007 through 2011

SB 1194 authorized the collection of $135 million per year between January 1, 2002, and January 1, 2012, with annual revenue adjustments. Specifically, SB 1194 states:

> The amounts shall be adjusted annually at a rate equal to the lesser of the annual growth in electric commodity sales or inflation, as defined by the gross domestic product deflator.[23]

Pursuant to SB 1194, the amount collected in 2005 is projected to be about $140 million. We escalated this amount by about 1.5 percent per year to estimate that $750 million ($150 million per year, on average) would result from the allocations suggested in this investment plan for RRTF money to be collected between January 1, 2007, and January 1, 2012. If the lesser of annual growth in electric commodity sales or inflation is below this rate on average, a smaller amount of funding will be available.[24]

Resources Eligible for the Renewables Portfolio Standard

Provided that additional criteria specified in SB 183, SB 1078, and the RPS guidebooks are met, central station or distributed electricity generation facilities using the following resources are likely to be eligible for the RPS:[25]

- Biomass: any organic material not derived from fossil fuels, including agricultural crops, agricultural wastes and residues, waste pallets, crates, dunnage, manufacturing and construction wood wastes, landscape and right-of-way tree trimmings, mill residues that result from milling lumber, rangeland maintenance residues, and wood and wood waste from timbering operations.
- Solar thermal electric: the conversion of sunlight to heat and its concentration and use to power a generator to produce electricity.
- Photovoltaic: a technology that uses a semiconductor to convert sunlight directly into electricity.
- Wind: energy from wind converted into mechanical energy and then electricity.
- Geothermal: natural heat from within the earth, captured for production of electric power.
- Fuel cells using renewable fuels: an advanced energy conversion device that combines hydrogen-bearing fuels with airborne oxygen in an electrochemical reaction to produce electricity very efficiently and with minimal environmental impact.
- Small hydroelectric: a facility employing one or more hydroelectric turbine generators, the sum capacity of which does not exceed 30 MW.
- Digester gas: gas from the anaerobic digestion of organic wastes.
- Municipal solid waste conversion: solid waste as defined in Public Resources Code section 40191.
- Landfill gas: gas produced by the breakdown of organic matter in a landfill (composed primarily of methane and carbon dioxide) or the technology that uses this gas to produce power.
- Ocean wave: an experimental technology that uses ocean waves to produce electricity.
- Ocean thermal: an experimental technology that uses the temperature differences between deep and surface ocean water to produce electricity.
- Tidal current: energy obtained by using the motion of the tides to run water turbines that drive electric generators.

For some resource types, RPS eligibility is contingent upon a number of criteria, including the type of fuel used, environmental impacts, whether/when a facility was owned by an IOU, and/or date of commencing commercial operations. For details regarding RPS eligibility please see the *Renewables Portfolio Standard Eligibility Guidebook*.[26]

Grid-Connected Distributed Generation

In addition, this investment plan discusses distributed generation energy systems eligible for incentives from the ERP element. DG is defined as electricity that is generated on-site or near the place of use, typically ranging in capacity from 3 kW to 10,000 kW; however, to avoid overlapping with the CPUC's distributed generation program, the ERP provides incentives for grid-connected DG systems under 30 kW in size.[27] Grid-connected DG is eligible for California's IOU, ESP, and CCA RPS programs, subject to certain rules established by the CPUC.[28]

Renewable Energy Certificates

A term used in this report that may be unfamiliar to the reader is renewable energy certificate (REC). A REC represents the renewable or "green" attributes of the electricity produced from renewable resources. A REC may be "bundled" with the underlying electricity or "unbundled" and sold separately. If a REC is unbundled from its associated energy, it is often termed a "Tradeable REC." Currently, RPS eligibility requirements specify that RECs must be bundled with the underlying electricity to be eligible for California's RPS.

Net Metering

Another term that may be unfamiliar is "net metering." The term generally refers to an arrangement with an electric utility that allows the DG owner's electricity meter to spin backward when the DG system is generating electricity and spin forward when the owner is drawing electricity from the grid.[29] At the end of a 12-month period, there is a balancing of the account. If the DG owner has used more electricity than the DG system generated, the DG owner pays the utility for the electricity. If the DG owner has used less electricity than the DG system generated, the account is reset to zero for the next 12-month period. This arrangement may be perceived as unfair to those who generate more electricity than they use and provides an incentive to match the size of DG systems to the on-site load, even if the potential to generate more renewable electricity goes untapped.

Under AB 728 (Negrete McLeod), Chapter 369, Statutes of 2005, an electrical corporation must consider the aggregate electrical load of a dairy across various meters in determining whether it is a net consumer or a net producer of electricity during the 12-month billing period.[30]

Chapter 1 Endnotes

[13] The Customer Credit Program was established to encourage consumers to purchase renewable electricity. Customer Credit incentives were paid to electric service providers registered with the Customer Credit Program. To receive funding the electric service providers were required to submit monthly performance reports including information on the amount of renewable generation procured and the customer credits that had been passed on to customers. In April 2003, the Energy Commission adopted a report for the Governor and Legislature pursuant to former Public Utilities Code Section 383.5 (f)(2)(E) recommending that the Customer Credit Program be discontinued. The Energy Commission subsequently discontinued the program. Payments made in December 2004 concluded Customer Credit activities.

[14] As reported in the *2005 Integrated Energy Policy Report*, *Commission Final Report,* p. 113-114, citing Patrick McGreevy, "Villaraigosa Appoints New DWP Board," August 16, 2005, http://www.latimes.com, accessed August 16, 2005.

[15] The amount shown for renewable energy does not include photovoltaic energy generation. The amount included for small hydro is an estimate prepared by Energy Commission staff, with data for recent years from the Energy Commission's net system power reports.

[16] The amount shown as solar in this figure does not include photovoltaic energy generation.

[17] California Energy Commission, "1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel)," http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS, accessed December 12, 2005. The amount shown for small hydro is an estimate prepared by Energy Commission staff, with data for recent years from the Energy Commission's net system power reports. This amount excludes energy from renewable distributed generation systems.

[18] California Energy Commission, "1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel)," http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS, accessed December 12, 2005. The amount shown for small hydro is from California Energy Commission, April 2005, *2004 Net System Power Calculation, Commission Report*, CEC-300-2005-004, http://www.energy.ca.gov/2005publications/CEC-300-2005-004/CEC-300-2005-004.PDF, accessed October 14, 2005, p. 3. This amount excludes energy from renewable distributed generation systems.

[19] Reserved funds are committed to meet legislative mandates but not yet formally assigned to specific projects. Legislative mandates are as follows: Generation from existing renewable facilities, supplemental energy payments under RPS, rebates for emerging renewable energy system installations, consumer education activities, and a renewable energy certificate tracking and registry system.

[20] [1]New Renewable Facilities Program encumbrances include $16.240 million in projects awarded funding under the second and third auctions that do not yet have Funding Award Agreements. [2]Existing Renewable Facilities Program disbursements include $6 million for the Agricultural Biomass-to-Energy Program. [3]Emerging Renewables encumbrance includes $2.25 million match funding for Solar Schools Program. [4]Collected funds do not include $18,632 in voluntary contributions. [5]Intrafund Reallocations include $10 million transfer from RRTF interest to Emerging Renewables Program and $8.692 million from state General Fund to Emerging Renewables Program. [6]Pursuant to Public Resources Code section 25751(f), the Energy Commission is authorized to transfer funds among program accounts in the RRTF for cash flow purposes, provided that the balance due each program account is restored and the transfers do not adversely affect any of the programs. Beginning in January 2005, AB 135 authorized the use of an additional $60 million of RRTF funds to be collected from 2007 through 2011 and subject to the repayment requirements of Public Resources Code section 25751(f). [7]$150 million and $8.9 million were loaned to the General Fund and the California Consumer Power and Conservation Financing Authority respectively, pursuant to 2002 Budget Act. The loan to the California Consumer Power and Conservation Financing Authority has been repaid. Note: Program and RRTF Balances are committed funds not yet formally assigned to specific projects but represent funds reserved to meet statutory requirements: Generation from existing renewable facilities, supplemental energy payments under RPS, rebates for emerging renewable energy system

installations, consumer education activities, and a renewable energy certificate tracking and registry system (WREGIS).

[21] After reducing demand through energy efficiency and demand response, the loading order calls for meeting new generation needs first with renewable and distributed generation resources and then with clean fossil-fueled generation. The loading order was adopted by the state's leading energy agencies in 2003. For further information, see California Energy Commission, July 2005, *Implementing California's Loading Order for Electricity Resources – Staff Report*, CEC-400-2005-043, http://www.energy.ca.gov/2005_energypolicy/documents/index.html#072505, accessed October 5, 2005. Also, see State of California, 2003, *Energy Action Plan*. California Power Authority, California Energy Commission, and California Public Utilities Commission; and State of California, 2005, *Energy Action Plan II*, California Energy Commission and California Public Utilities Commission. Both documents are available at http://www.energy.ca.gov/energy_action_plan/index.html, accessed October 5, 2005.

[22] Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 14.

[23] SB 1194 (Sher), Chapter 1050, Statutes of 2000, http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_1151-1200/sb_1194_bill_20000930_chaptered.pdf, accessed October 25, 2005.

[24] The forecasted growth in IOU retail electricity sales for 2005 through 2011 is estimated to be 1.5 percent, based on "Form 1.c - Statewide Retail Sales by Utility (GWh)" in California Energy Commission, October 2005, *California Energy Demand 2006-2016 Staff Energy Demand Forecast, Revised September 2005, Staff Final Report*, Corrected Edition, CEC-400-2005-034-SF-ED2, http://www.energy.ca.gov/2005publications/CEC-400-2005-034/CEC-400-2005-034-SF-ED2.PDF.

[25] See Energy Commission*, Renewables Portfolio Standard Eligibility Guidebook*, 500-04-002F; Energy Commission, *Renewables Portfolio Standard Overall Program Guidebook*, 500-04-026; and Energy Commission, *New Renewable Facilities Program Guidebook*, 500-04-001F. Proposed revisions to these guidebooks, available at http://www.energy.ca.gov/portfolio/documents/index.html, were discussed at a workshop on December 7, 2005. The Energy Commission plans to consider the proposed changes for adoption at its January 18, 2006, business meeting.

[26] California Energy Commission, August 11, 2004, *Renewables Portfolio Standard Eligibility Guidebook*, 500-04-002F1, http://www.energy.ca.gov/portfolio/documents/index.html, accessed October 18, 2005. For proposed revisions see California Energy Commission, November 2005, *Renewables Portfolio Standard Eligibility Guidebook*, *Draft Guidebook*, CEC-300-2005-028-SD, http://www.energy.ca.gov/portfolio/documents/index.html, accessed December 12, 2005. The Energy Commission plans to consider the proposed changes for adoption at its January 18, 2006, business meeting.

[27] Small wind systems of up to 50 kW in size may participate in the Emerging Renewables Program, but the rebates for such systems are limited to less than 30 kW.

[28] See CPUC Decision 02-10-062, which states that only new renewable distributed generation installations are eligible for the RPS (existing renewable distributed generation does not count toward the utility's RPS calculation). In Rulemaking 01-10-024, "Interim Opinion," http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/20249.doc. See also, D. 05-05-011, "Order Clarifying Participation of Renewable Distributed Generation in the Renewable Portfolio Standards Program," http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/46213.htm.

[29] There are five different types of net metering in California. They are as follows:

1. "Net energy metering" as defined in Public Utilities Code (PUC) section 2827(b)(3) and applicable to "eligible customer generators" as defined in PUC 2827(b)(2), which includes solar, wind, and solar/wind hybrid DG systems no larger than 1 MW in capacity.
2. "Wind energy co-metering" as defined in PUC 2827(b)(4) and applicable to wind DG system that are larger than 50 kW in size, but not more than 1 MW in size.
3. "Co-energy metering" as defined in PUC 2827(b)(5) and applicable to solar, wind, and solar/wind hybrid DG that are larger than 10 kW in size, but not more than 1 MW in size, and located in POU service territories where the POUs have elected to offer co-energy metering.

4. "Net energy metering" as defined in PUC 2728.9(b)(4) and applicable to "eligible biogas digester electrical generating facilities" as defined in PUC 2728.9(b)(3).
5. "Net energy metering" as defined in PUC 2728.9 and applicable to "eligible fuel cell customer-generators" as defined in PUC 2728.10(a)(3).

[30] Eligibility is limited to biogas digester generating facilities that have a generating capacity of not more than 1 MW, with the following exception: the law allows up to three large biogas digester generating facilities of not more than 10 MW. [Public Utilities Code section 2827.9, subd.(e).]

CHAPTER 2: NEW RENEWABLE FACILITIES PROGRAM

The CPUC and the Energy Commission administer the RPS program for IOUs, ESPs, and CCAs, although rules for the latter two types of load-serving entities have not yet been developed. Nonetheless, ESP and CCA obligations to meet 20 percent renewables by 2017, accelerated by the CPUC to 20 percent by 2010, began accumulating on January 1, 2003. Publicly owned utilities are responsible for implementing their own RPS programs.

Table 2 shows the progress of California's largest three IOUs in meeting the state's RPS and provides a reference to their current RPS solicitations. Pacific Gas and Electric Company (PG&E) had 12 percent renewables in 2004, Southern California Edison (SCE) had more than 18 percent, and San Diego Gas & Electric (SDG&E) had 4.5 percent.

Table 2. California Investor-Owned Utilities Progress toward 20 percent Renewables by 2010

IOU	2001	2004	2005 Request for Offers (RFO)
PG&E	8.9%	12%	www.pge.com/renewableRFO
SCE	16.6%	18.2%	www.SCE.com/RenewRFP
SDG&E	1.0%	4.5%	www.sdge.com/renewablerfo

Source: California Energy Commission, July 2005, *Implementing California's Loading Order for Electricity Resources, Staff Report*, CEC-400-2005-043, Appendix A, http://www.energy.ca.gov/ 2005_energypolicy/ documents/index.html#072505

Policy Context

After energy efficiency and demand response, California's loading order policy for electricity states that new generation should be fueled by renewable resources. The RPS program, accelerated to reach 20 percent by 2010 statewide, is central to meeting California's renewable resource goals. However, the *2005 Energy Report* states that the current process for procuring renewable resources is overly complex, delaying the state's ability to achieve its renewable energy goals. To address these problems, the *2005 Energy Report* recommends the following:

- The RPS program is in need of a mid-course review and correction. After completion of the 2005 round of IOU solicitations, the CPUC and the Energy Commission should investigate whether a simpler and more transparent RPS process would better achieve the state's 2010 goals. A seminal question is the likely impact of the CPUC's "rebuttable presumption" for renewables

directive for IOU all-source procurement. This review should be completed and transmitted to the Governor and Legislature by January 1, 2007.

- The CPUC should allow for changes to the current program that can be accomplished under existing RPS law, including inter-utility trades under flexible compliance, the use of shaped products, and more flexible delivery requirements, as well as changes to transmission cost adders…[31]

California and other members of the Western Electricity Coordinating Council (WECC) have a broad and varied mix of renewable energy potential, ranging from resource rich areas that require new transmission to aging or off-line renewable facilities that should be repowered. This is particularly important for the state's aging wind facilities, as stated in the *2005 Energy Report*:

> The state needs to focus on repowering aging wind facilities to increase the amount of renewable generation from these prime sites and reduce the number of bird deaths caused by wind turbines. The state also needs to conduct additional research and development at both the Energy Commission and the California Independent System Operator (CA ISO) to address current barriers to integrating intermittent wind resources into the state's transmission system.[32]

In addition to the RPS, which focuses on electricity generation from renewable resources, the state is exploring the development of renewable energy as alternative sources of natural gas production:

> To diversify California's natural gas supply sources, the state can examine the feasibility of increasing natural gas production from more innovative sources. For example, California is rich in biomass resources that are suitable as a feedstock for gasification technologies. Landfills in California currently produce natural gas, some of which is captured, cleaned, and used. Agricultural waste can be converted to synthetic natural gas. Underground gaseous reservoirs contain natural gas that does not meet pipeline specifications but that could still be converted to useful energy. Each of these potential alternatives presents technological and cost challenges to ensure that produced gas meets quality specifications and environmental protection requirements. Fortunately, these challenges are appropriate subjects of the state's natural gas research and development program.[33]

Recommended Allocation

Adding to the $347.63 million remaining from SB 1038 allocations for SEPs for eligible RPS contracts, we recommend allocating 38 percent (estimated to be $285 million) of the funds collected between January 1, 2007, and January 1, 2012 for production incentives for energy generated from new power plants that come

online or are repowered after the date legislation is enacted to re-authorize the Energy Commission's Renewable Energy Program. We also recommend increasing the flexibility to reallocate funds as needed to address changing market conditions. These recommendations are based on public information regarding RPS contracts approved by the CPUC through October 2005, none of which requires SEPs, as well as rollover of unused SB 1038 SEP funds, the high price of natural gas, and uncertainty regarding above-market RPS costs for request for offers (RFOs) held between 2005 and 2009.

RPS Contracts Approved by the CPUC

Table 3 lists the RPS contracts for new or repowered renewable energy that have been approved by, or submitted to, the CPUC through October 2005. Most of the capacity of the RPS contracts to date uses solar thermal electric technology. None of these contracts requires SEPs.

Table 3. IOU RPS Contracts for New or Repowered Renewables by Technology (MW)

	PG&E	SCE	SDG&E	TOTAL
Wind	167 – 190	121 – 345	358	646 – 893
Wind Repowering	84 – 99	37	0	120 – 135
Geothermal	0	30 – 120	0	30 – 120
Biomass	18	12 – 37	75	106 – 131
Solar Thermal Electric	0	500 - 850	300 - 900	800 – 1750
Small Hydropower	0	0	5	5
TOTAL	269 - 306	700 - 1389	738 - 1338	1707 – 3033

This table includes contracts for new and repowered renewable energy capacity submitted to or approved by the CPUC since 2002 updated through October 28, 2005. Capacity additions do not include four contracts that SCE signed under its 2002 RFO, as at least one of those contracts has been terminated (TrueSolar), and information on the resource type and/or project size of the other three is not publicly available. RPS contracts executed to date are priced at or below the MPR and will not need supplemental energy payments.

Source: Energy Commission RPS staff and Wiser et al (October 2005), *The Electricity Journal*, Vol. 18, Issue 8, pp. 55-67.

Rollover of Unused Supplemental Energy Payment Funds

As of December 1, 2005, no RPS contracts have applied to the Energy Commission for SEPs; however, results of the 2005 IOU RPS RFOs are not yet known. As a result, we included the $347.63 million of SB 1038 funding for SEPs in the amount of

funds we anticipate may be needed for above market costs of RPS contracts from IOU RFOs held in 2005-2009 to achieve 20 percent renewables by 2010.

High Price of Natural Gas

As the price of natural gas rises, a wider variety of renewable energy sources are likely to become competitive, reducing the aggregate amount of funds needed for SEPs to reach the state's RPS goals. Also, increasing the fuel diversity in California's electricity generation sector will reduce the potential impact of rising natural gas prices and the price of electricity to end users in California.

The weighted average cost of natural gas for California gas utilities has varied widely from January 2000 through September 2005, with prices generally rising during the past three years. As stated in the *2005 Energy Report*, half of the gas consumed in California is used to generate electricity: "Consequently, any disruptions to supply or spikes in price directly affect the state's ability to generate electricity and to do so at competitive prices."[34] In 2004, natural gas fueled more than 40 percent of California's in-state electricity generation.[35]

The *2005 Energy Report* indicates there is continued volatility and uncertainty in natural gas prices. Nonetheless, prices are expected to remain high in general:

> California has little influence over national natural gas market prices. Even when California's own demand is moderate, in-state prices can spike in response to extreme weather conditions in other parts of the country. In the past two years, natural gas prices have dramatically increased, and short-term natural gas market prices are now highly volatile. Although there could be a drop in natural gas prices over the next several years with the introduction of large new supplies into the market such as LNG [(liquefied natural gas)] and major pipeline additions, Energy Commission staff models project a general increase in national natural gas wellhead prices over the next decade. The general increase reflects the growing difficulty of producing gas in the nation's conventional gas producing regions but does not account for market volatility and short-term price spikes.[36]

The *2005 Energy Report* adds:

> Natural gas prices for electricity generators are expected to fluctuate between $4.24 and $7.00 per Mcf [(thousand cubic feet)] over the next 10 years and vary based on whether or not the generator is served by a natural gas utility or takes its fuel supplies directly from another source, such as an interstate pipeline or local gas producer, as well as where the generator is located and when the facility began operation.

> Since the energy crisis of 2001, natural gas prices that were anticipated to revert to the trends of the previous 10 to 15 years have instead consistently remained high. Global crude oil markets, a decreasing rate in finding new natural gas supplies, and events related to weather — most recently Hurricanes Katrina and Rita — have continued to put pressure on natural gas prices across the nation. Generally, when hurricanes impact the industry, producers and pipelines recover and resume normal operations within one to three months. However, the repeated and harsh impacts of this season's two major hurricanes have dramatically increased natural gas prices, with price and supply effects possibly lasting for more than six months. These trends will likely continue to place upward pressure on natural gas prices. It is the industry's anticipation that the prices may not back down from the high levels seen today for a significant period of time.[37]

However, as noted in the *2005 Energy Report*, a fundamentals forecast may underrepresent future market prices.[38] According to a recent memorandum from Mark Bolinger and Ryan Wiser of Lawrence Berkeley National Laboratory, past natural gas forecasts have not accurately predicted actual wellhead prices and should be used with caution:

> [T]he [U.S. Department of Energy, Energy Information Administration] EIA grossly over-projected the price of gas in the late 1980s, and conversely has grossly under-projected the price of gas since the mid-1990s (we suspect that other providers of fundamentals-based long-term forecasts have experienced similar levels of inaccuracy). This poor track record suggests that, when valuing generation assets, little weight should be placed on long-term, fundamental forecasts such as those created by the EIA, and that sizable uncertainty bounds should be used regardless of which "base-case" forecast is used.[39]

Uncertainty Regarding Above-Market Costs

Beyond uncertainty regarding natural gas prices, there is technology-driven uncertainty as well. For example, the two solar thermal electric contracts signed to date use a new technology that has not yet been utilized on a commercial scale. The public, redacted version of information on the SCE contract with Stirling Energy Systems, Inc., indicates that development of the 500-850 MW provided for in the power purchase agreement depends upon the success of a 1 MW pilot project to:

> (i) Validate the technical viability of the equipment and supply chain;
> (ii) Validate the technical viability of large-scale field installation procedures;
> (iii) Mitigate the risks inherent in moving from a prototype to commercial development and operation; and
> (iv) Establish performance and operating standards and protocols.[40]

Above-market costs for the IOU RPS may also be affected by the number of renewable contracts signed to date that result in completed projects. If these contracts are unsuccessful in delivering the expected amount of renewable energy to the IOUs, the IOUs will need to enter into additional contracts to make up the shortfall. While the contracts signed to date have not required SEPs, it is uncertain whether the same will be true for future contracts.

Recognizing that there are many legitimate reasons for cancellation and delay of otherwise sound RPS contracts, the *2005 Energy Report* recommended a 30 percent contract-risk reserve margin as a prudent starting point to prevent under-procurement, subject to revision as data become available regarding actual versus contracted RPS energy (p. 112).

Historically, the success rate of California capacity from all types of "qualifying small power production facility" contracts and self-generation has been about 70 percent, while the success rate for renewable capacity from such contracts has been about 45 percent.[41] Referring to this and other historical experiences, as well as the success rate of newer renewable contracts across the United States and in Europe, a recent study suggests that the success rate of contracted renewable capacity should not be expected to exceed 70 percent to 80 percent overall.[42] In the study, the most frequently mentioned barrier to development of contracted projects was siting and permitting, especially in RFOs allowing early-stage projects to bid. Financing and capital cost increases were also mentioned frequently, followed by transmission access for contracted renewable projects.[43]

In the supplement to its 2005 long-term RPS plan, SCE identifies transmission costs as the primary reason contracted projects are unlikely to become operational as scheduled. SCE states that six of eight contracted RPS projects will need substantial transmission upgrades, which "do not appear likely to be completed in time for SCE to achieve 20 percent renewables by 2010."[44] Furthermore, SCE expects contracted projects resulting from future RPS RFOs to be located in the same or similar resource-rich areas of the state that will also require substantial transmission upgrades.[45]

SDG&E also stresses the need for transmission development:

> SDG&E has publicly stated and continues to believe that full development of the potentially significant renewable resources in areas such as the Imperial Valley, Tehachapi, and other parts of California will require significant investment in transmission infrastructure in order to economically deliver this generation to market. In addition, SDG&E continues to support some form of mechanism for using RECs for RPS compliance.[46]

Applications for transmission lines in the Tehachapi Mountains and Imperial Valley have been submitted to the CPUC for approval. In addition, two POUs and Citizens Energy have announced plans to build a transmission line to access renewable

resources in the Imperial Valley.[47] Transmission access to these two resource-rich areas, as well as others identified by the IOUs in their long-term RPS plans, will greatly affect the state's ability to meet its RPS goals, as well as the mix of contracted technologies that become operational.

Scenarios for Potential Supplemental Energy Payment Requests

Although it cannot be known in advance what the technology mix will be or what level of SEPs may be required, we have used publicly available information from the IOUs' long-term RPS plans and estimates of technical potential to prepare a range of scenarios to anticipate potential IOU SEP requests over the 2005-2009 time period. The scenarios reflect four levels of renewable energy delivered from publicly available information on the RPS contracts signed as of November 2005:

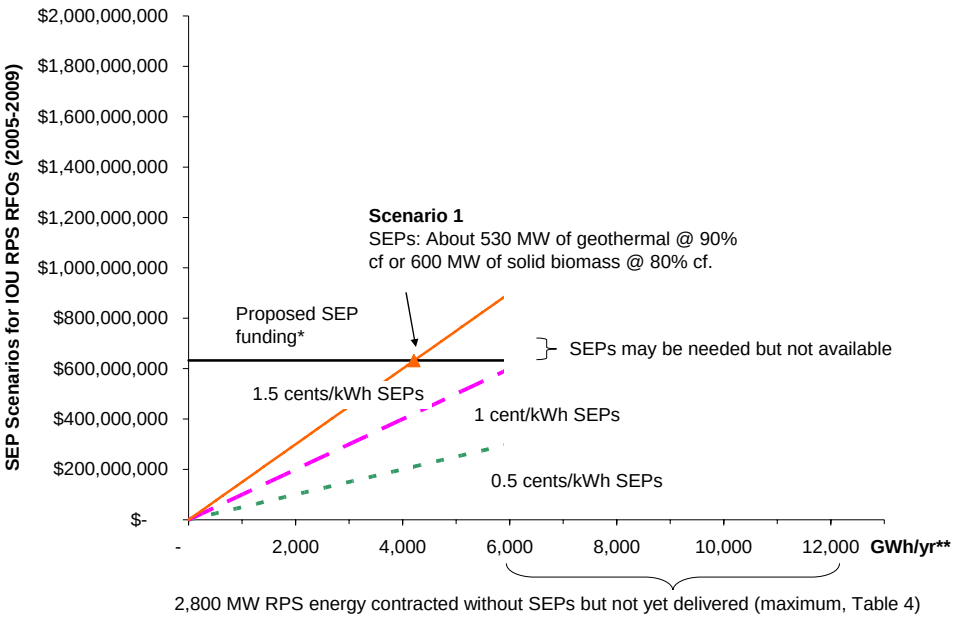
- Maximum: 3,033 MW operational by 2010 producing 7,900 GWh above 2004
- Minimum: 1,707 MW by 2010, about 4,100 GWh above 2004
- Minimum without solar: 907 MW operational by 2010 (low end of signed contracts except solar thermal electric), about 2,350 GWh above 2004
- No unbuilt contracts signed before 2006 without SEPs become operational.[48]

The Energy Commission staff estimates that 20 percent of IOU retail sales will be 35,276 GWh in 2010. IOUs reported procuring 22,515 GWh in 2004.[49] The difference, 12,761 GWh by 2010, was the amount of additional renewable energy used for developing scenarios for potential SEP requests in 2005-2009. The amount of energy above 2004 procurement needed in each of the four levels of signed contract development ranges from 38 percent in the maximum condition to 100 percent in the condition assuming no unbuilt contracts signed before 2006 become operational.

Figures 4-7 show the amount of geothermal or biomass capacity that could be supported by the proposed allocation of funding under each condition. For illustrative purposes, SEP levels are shown to vary from one-half cent/kWh to 1.5 cent/kWh. Assuming SEPs are paid for the first 10 years of operation, any combination of SEP level and energy requiring about $633 million or less (shown by the horizontal line in each section of Figure 4 through Figure 7) could be supported with the proposed allocation of funds.

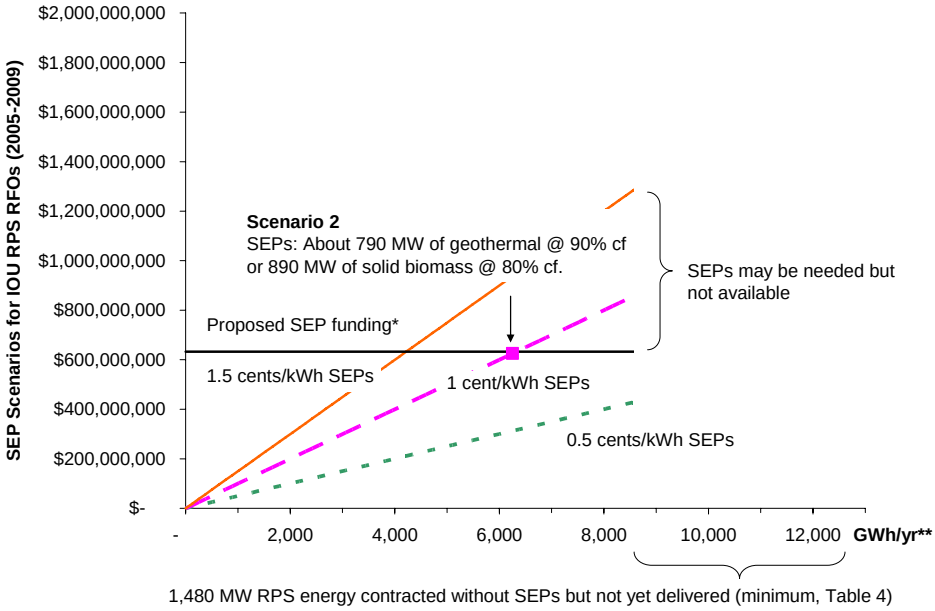
Scenario 1 is the point on the line depicting a 1.5 cent/kWh SEP level that could be supported by the proposed allocation of funds for SEPs. This amount of energy could be provided by about 530 MW of geothermal at 90 percent capacity factor or 600 MW of solid biomass at 80 percent capacity factor. Under the maximum build-out of signed contracts, the energy supported by SEPs would provide support for most of the unmet additional IOU RPS energy requirements, leaving about 680 GWh in 2010 to be met by new contracts without SEPs, such as 220 MW of wind at 35 percent capacity factor.

Figure 4. Scenarios for Potential IOU SEP Requests with 100 Percent of Maximum Contracted Capacity[50]



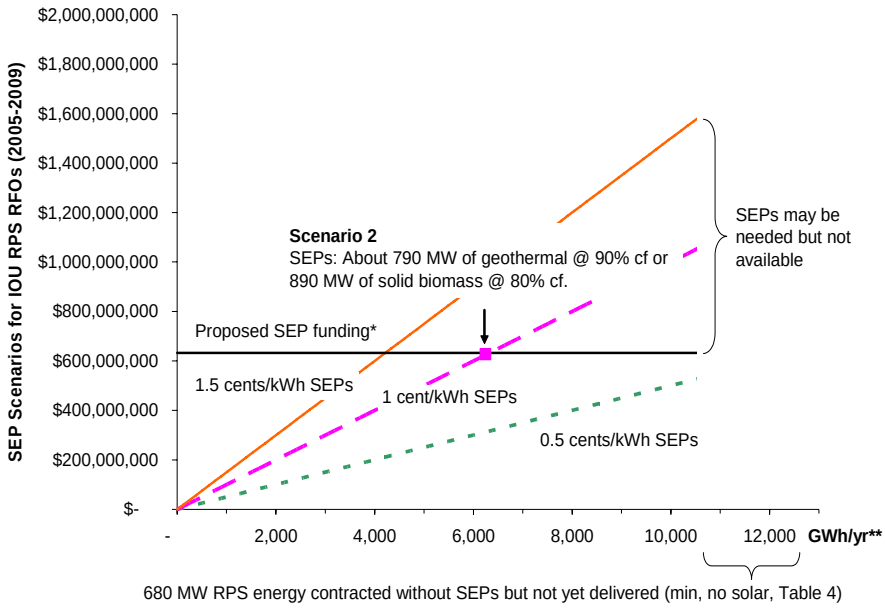
Source: California Energy Commission Renewable Energy Program Staff.

Figure 5. Scenarios for Potential IOU SEP Requests with 100 percent of Minimum Contracted Capacity[51]



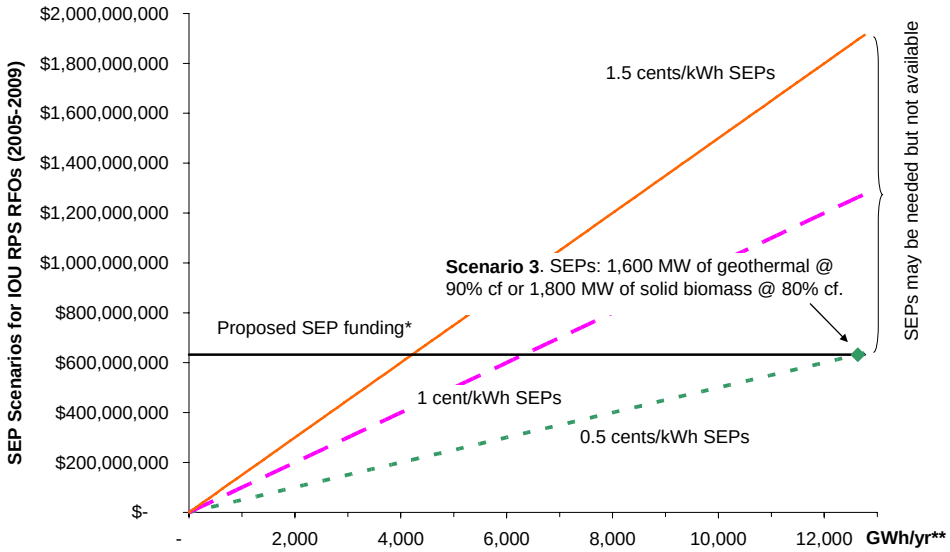
Source: California Energy Commission Renewable Energy Program Staff.

Figure 6. Scenarios for Potential IOU SEP Requests: Minimum Contracted Capacity with Commercialized Technologies[52]



Source: California Energy Commission Renewable Energy Program Staff.

Figure 7. Scenarios for Potential IOU SEP Requests: No Contracted Capacity added beyond Amount Operating in 2004[53]



Source: California Energy Commission Renewable Energy Program Staff.

Scenario 2 is the point on the line depicting the 1 cent/kWh SEP level that could be supported by the proposed allocation of funds for SEPs. This amount of energy could be provided by about 790 MW of geothermal or 890 MW of solid-fuel biomass.

Under minimum build-out of signed contracts (1,707 MW by 2010), this would leave about 2,400 GWh in 2010 to be met with new contracts without SEPs, such as about 780 MW of wind. Under minimum build-out of signed contracts without 800 MW of signed solar thermal electric capacity, Scenario 2 would leave about 4,150 GWh in 2010 to be met by new contracts without SEPs, such as 1,350 MW of wind.

Scenario 3 is the point on the line depicting the one-half cent/kWh SEP level that could be supported by the proposed allocation of funds for SEPs. This amount of energy could be provided by about 1,600 MW of geothermal or 1,800 MW of solid biomass. This would provide 99 percent of the additional RPS energy needed above 2004 levels. The remaining 1 percent (about 130 GWh in 2010) could be met with contracts without SEPs for about 40 MW of wind or 17 MW of biogas.

Installed gross geothermal capacity in California is about 1,870 MW. Estimated in-state undeveloped technical potential for geothermal is about 2,860 MW. Undeveloped technical potential is more than 6,800 MW for out-of-state geothermal in the WECC. About 600 MW of solid-fuel biomass plants were operating in 2005. Estimated in-state undeveloped technical potential for solid-fuel biomass in 2005 is about 3,400 MW. Estimated undeveloped biomass and biogas technical potential in other WECC states is more than 5,500 MW. In 2003, there were about 1,870 MW of installed high-speed wind in California. Estimated in-state undeveloped technical potential for high-speed wind is more than 12,000 MW, and more than 350,000 MW out of state. Out-of-state eligible projects may also compete for RPS contracts and SEPs, provided certain environmental and deliverability conditions are met.[54]

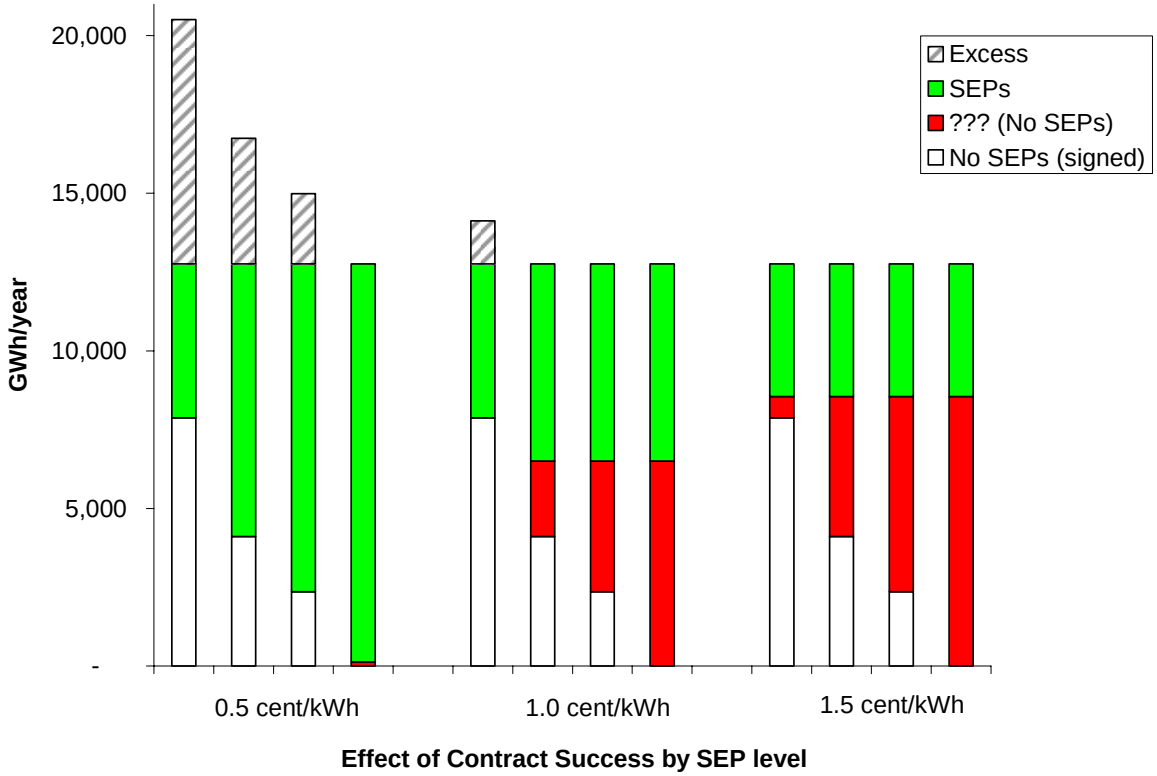
The scenarios, summarized in Figure 8, suggest that the proposed allocation for SEPs may be sufficient, if there is a high success rate for signed RPS contracts for plants that are not operating yet (left-most column for each SEP level), low levels of above-market costs per kWh (averaging 0.5 cent/kWh over next five years), or high availability of future RPS contracts without SEPs (right-most columns at 1.5 cent/kWh). However, there are many variables that could greatly affect the amount of SEPs requested for IOU RPS contracts as market conditions change, indicating that flexibility to respond to these changes is essential to program success.

Authority to Reallocate Funds to Other Elements of Program

As stated above, we recommend authorizing the Energy Commission to retain the flexibility to reallocate funds to the NRFP from other elements of the Renewable Energy Program as needed to address changing market conditions. Recognizing that market conditions could result in an over-allocation of funding for SEPs, we also

recommend a legislative change to authorize the Energy Commission to reallocate funds away from the NRFP element to other elements of the Renewable Energy Program through the public guidebook revision process as needed to address changing market conditions.

Figure 8. Effect of Success Rate of Signed Unbuilt RPS Contracts on Scenarios for SEP Requests



Columns for each SEP level (left to right): maximum, minimum, minimum without solar, and no signed unbuilt contracts become operational.

Source: California Energy Commission, Renewable Energy Program Staff

Chapter 2 Endnotes

[31] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/.
[32] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report*, p. E-7.
[33] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report*, p.140.
[34] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report,* p. 127.
[35] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report,* p. 38.
[36] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report,* p. 132.
[37] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report,* p. 132.
[38] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report – Commission Final Report,* p. 133.
[39] Mark Bolinger and Ryan Wiser, December 19, 2005, "Memorandum: Comparison of AEO 2006 Natural Gas Price Forecast to NYMEX Futures Prices," Lawrence Berkeley National Laboratory, U.S. Department of Energy, http://eetd.lbl.gov/ea/emp/reports/53587_memo.pdf, p. 4.
[40] Southern California Edison, August 11, 2005, "Redacted Public Version, Advice Letter 1909-E: Submission of Contract for Procurement from Renewable Energy Resource Pursuant to California Renewables Portfolio Standard Program."
[41] KEMA, Inc., January 2006, *Building a "Margin of Safety" Into Renewable Energy Procurements: A Review of Experience with Contract Failure, Consultant Report*, pp. 10-11.
[42] The study concludes: "Though there is considerable variation among utilities with contract failure, and data limitations prevent robust conclusions, the experience presented in this report suggests that an overall failure rate of 20 to 30 percent should likely be considered the minimum level of expected failure for large RFOs conducted over multiple years (any individual RFO may well be able to beat these failure rates). In fact, failure rates much higher than these levels (50 percent, or even greater in some cases) are supported by historical experience, especially for projects that use pre-commercial technologies or that (like many projects in California) are likely to face siting, permitting, resource supply, transmission, or other barriers to development. Somewhat supportive of failure rates at these or higher levels is recent experience with renewable energy contracting by California's IOUs, which shows what appears to be a healthy degree of contract failure; we have no reason to believe that this will not continue in future RFO cycles, especially as the state's utilities dig deeper into the pool of possible projects." KEMA, Inc., forthcoming 2006, *Building a "Margin of Safety" Into Renewable Energy Procurements: A Review of Experience with Contract Failure, Consultant Report,* p. 42.
[43] KEMA, Inc., forthcoming 2006, *Building a "Margin of Safety" Into Renewable Energy Procurements: A Review of Experience with Contract Failure, Consultant Report,* p. 25.
[44] Southern California Edison, December 7, 2005, "Redacted Public Version: Southern California Edison Company's (U 338-E) Supplement to its Renewable Procurement Plan 2005-2014," https://www.pge.com/regulation/RenewablePortfolioStdsOIR/Other-Docs/SCE/2005-01-Fwd/RenewablePortfolioStdsOIR_Other-Doc_SCE_20051207-01.pdf, p. 13.
[45] Southern California Edison, December 7, 2005, "Redacted Public Version: Southern California Edison Company's (U 338-E) Supplement to its Renewable Procurement Plan 2005-2014," https://www.pge.com/regulation/RenewablePortfolioStdsOIR/Other-Docs/SCE/2005-01-Fwd/RenewablePortfolioStdsOIR_Other-Doc_SCE_20051207-01.pdf, p. 3.
[46] San Diego Gas and Electric Company, December 6, 2005, "Supplement to the Long-Term Procurement Plan of San Diego Gas and Electric Company (U 902 E) for the Renewables Portfolio Standard Program," https://www.pge.com/regulation/RenewablePortfolioStdsOIR/Other-Docs/SDGE/2005-01-Fwd/RenewablePortfolioStdsOIR_Other-Doc_SDGE_20051206-01.doc, p. 17.

[47] City of Los Angeles, Office of the Mayor, "City of L.A. Launches the 'Green Path Project'," http://www.lacity.org/mayor/myree/mayormyree246633652_11162005.pdf.

[48] Capacity factors published in the 2003 *Renewable Resources Development Report* were used to estimate energy for each of the four levels of contract success: the capacity factor for geothermal was 90 percent, biomass was 80 percent, small hydropower was 40 percent, wind was 35 percent, and concentrating solar power was 25 percent.

[49] The amount of IOU RPS electricity procured in 2004 was 22,516 GWh according to the California Energy Commission, January 6, 2006, *Renewables Portfolio Standard Procurement Verification Report - COMMITTEE DRAFT*, CEC-300-2006-002-CTD, Table 18, p. 30. The Energy Commission is scheduled to consider adopting this report at the January 18, 2006 business meeting.

[50] Assumes 3,033 MW of signed contracts (maximum contracted) operating in 2010; 2,800 MW of which to be added 2005-2009, assuming about 150 MW wind and 75 MW of biomass delivered RPS energy in 2004. *Includes rollover of SB 1038 New Renewable Facilities Program funds, 38 percent of 2007-2011 funds, and repayment of $150 million loaned to the General Fund. **Twenty percent of IOU 2010 sales estimated to be 35,276 GWh. IOU RPS procurement in 2004 was 22,515 GWh. Average of 2,552 GWh/year needed 2005-2009.

[51] Assumes about 1,700 MW of signed contracts (minimum contracted) operating in 2010; 1,480 MW of which to be added 2005-2009, assuming about 150 MW wind and 75 MW of biomass delivered RPS energy in 2004. *Includes rollover of SB 1038 New Renewable Facilities Program funds, 38 percent of 2007-2011 funds, and repayment of $150 million loaned to the General Fund. **Twenty percent of IOU 2010 sales estimated to be 35,276 GWh. IOU RPS procurement in 2004 was 22,515 GWh. Average of 2,552 GWh/year needed 2005-2009.

[52] Assumes about 900 MW of signed contracts (minimum contracted, except solar) operating in 2010; 680 MW of which to be added 2005-2009, assuming about 150 MW wind and 75 MW of biomass delivered RPS energy in 2004. *Includes rollover of SB 1038 New Renewable Facilities Program funds, 38 percent of 2007-2011 funds, and repayment of $150 million loaned to the General Fund. **Twenty percent of IOU 2010 sales estimated to be 35,276 GWh. IOU RPS procurement in 2004 was 22,515 GWh. Average of 2,552 GWh/year needed 2005-2009.

[53] Assumes no additional energy from signed contracts to be added 2005-2009, assuming about 150 MW wind and 75 MW of biomass of the 3,033 MW signed contracts delivered RPS energy in 2004. *Includes rollover of SB 1038 New Renewable Facilities Program funds, 38 percent of 2007-2011 funds, and repayment of $150 million loaned to the General Fund. **Twenty percent of IOU 2010 sales estimated to be 35,276 GWh. IOU RPS procurement in 2004 was 22,515 GWh. Average of 2,552 GWh/year needed 2005-2009.

[54] California Energy Commission, April 2005, *California Geothermal Resources - Staff Paper*. CEC-500-2005-070, http://www.energy.ca.gov/2005publications/CEC-500-2005-070/CEC-500-2005-070.PDF, p. 7. California Energy Commission, June 2005, *Biomass In California: Challenges, Opportunities, and Potentials for Sustainable Management and Development, PIER Collaborative Report*, CEC-500-2005-160, http://www.energy.ca.gov/2005publications/CEC-500-2005-160/CEC-500-2005-160.PDF, p. 35 (Table 4, agriculture, forestry, biosolids diverted, and total MSW biomass diverted: technical potential less existing/planned). The amount of solid-fuel biomass capacity operating in California in 2005 is from Biomass Energy Alliance, LLC., letter to the Renewables Committee, California Energy Commission, regarding the Draft 2006 Renewable Energy Investment Plan – Docket#00-REN-1194, [http://www.energy.ca.gov/renewables/investmentplan/documents/2005-11-14_workshop/comments/], accessed December 16, 2005. California Energy Commission, April 2005, *California Wind Resources, Draft Staff Paper*, CEC-500-2005-071-D, http://www.energy.ca.gov/2005publications/CEC-500-2005-071/CEC-500-2005-071-D.PDF, Table 6 (14,346 MW high speed wind at 70 meters), less 1,880 MW installed MW in 2003 shown in Table 4. California Energy Commission, November 2003, Renewable Resources Development Report, 500-03-080F, http://www.energy.ca.gov/renewables/02-REN-1038/documents/index.html, Appendix C-21. California Energy Commission, November 2005, *Renewables Portfolio Standard Eligibility Guidebook, Draft Guidebook*, CEC-300-2005-028-SD, http://www.energy.ca.gov/2005publications/CEC-300-2005-028/CEC-300-2005-028-SD.PDF. The Energy Commission plans to consider this draft guidebook for adoption in January 2005.

CHAPTER 3: EMERGING RENEWABLES PROGRAM

The ERP offers incentives for the following grid-connected DG emerging renewable energy resources: PV, solar thermal electric, small wind, and renewable-source fuel cells. Grid-connected DG PV systems represent the overwhelming majority of rebate applications and payments from the ERP. To avoid overlap with the CPUC Self-Generation Incentive Program, the ERP does not provide rebates to systems 30 kW or larger.

Currently, the rebate for eligible PV systems is $2.80 per watt, with rebates for owner-installed systems discounted by 15 percent. For eligible distributed solar thermal electric and renewable-source fuel cells, the rebate level is $3.20 per watt. For the first 7.5 kilowatts (kW) of small wind, the rebate level is $1.70 per watt. For increments above 7.5 kW of small wind, the rebate is $0.70 per watt. The Energy Commission has been reducing these rebate levels over time in response to market trends. The Energy Commission is considering raising the rebate level for small wind based on the drop in reservation applications and comments received on the proposed guidebook revisions published in November 2005.

Under SB 1038, 17.5 percent of funds collected between January 1, 2002, and January 1, 2007, were allocated to the ERP, about $118 million over five years. In 2004, 9 percent ($60.75 million) of SB 1038 funds originally allocated to the Customer Credit Program were reallocated to the ERP, bringing the ERP allocation to 26.5 percent. In response to changing market conditions, additional funds have been reallocated from other elements of the Renewable Energy Program, consistent with the Energy Commission's authority under SB 1038 and Public Resources Code section 25748(b). In fiscal year 2004-2005 alone, the ERP paid $55.9 million in rebates.

Policy Context

The Governor's goal to achieve 1 million solar roofs or the equivalent of 3,000 MW by 2018 is the driving policy initiative for emerging renewables during the period covered by this investment plan. To support the Governor's goal in this area, the CPUC and the Energy Commission developed the California Solar Initiative (CSI) in Rulemaking 04-03-017, which aims to accomplish the Governor's goals under existing statutory authority if pending legislation, such as SB 1 (Murray), also known as the Million Solar Roofs Initiative, is not passed into law. The CPUC adopted a decision to launch the CSI on January 12, 2006.

The CSI would coordinate the parts of the CPUC's SGIP and Energy Commission's ERP programs that provide incentives for DG solar energy systems. The CSI also aims to coordinate energy efficiency improvements with DG solar installations. The

CPUC's part of the CSI includes commercial and existing residential applications using new funds to be collected from the IOUs. In contrast, the Energy Commission's part of the CSI focuses on new construction residential applications using a portion of the funds already being collected pursuant to RESIA.

The Energy Commission plans to develop guidelines for its part of the CSI before the end of the year, revising the guidelines thereafter as needed to respond to changing market conditions. The guidelines will be developed following the Renewable Energy Program protocols for guidebook development, including opportunities for public comment at workshops or hearings.

Building on previous *Energy Reports*, the *2005 Energy Report* recommends the following principles for developing the photovoltaic market in California:

> The principles outlined in the 2004 Energy Report Update for a successful and rational PV program still apply today. Achieving the scale proposed by the Governor requires a broad program that includes all residential and commercial buildings, whether existing or new. Also, because leveraging energy efficiency improvements should be a key consideration in deploying PV, new homes should be required to exceed current building [energy] efficiency standards, while existing buildings should be required to improve their [energy] efficiency by a fixed percentage. Similarly, PV installations should be linked to dynamic pricing tariffs and advanced metering to use solar systems to meet peak load, thereby lowering electric system costs and rates. Further, to provide the most benefit, solar installations should be targeted to climate zones with high peak demands for air conditioning.
>
> A sound solar program should also include consistent, long-term declining incentives to provide the volume of sales and commitment needed to bring manufacturing and other costs down. The failure of the state's PV incentive programs to bring costs down, and the severe oversubscription in those programs, indicates that up-front rebates may not be the most efficient use of public funds to achieve the goal of a sustainable solar industry. Instead, as articulated in the *2004 Energy Report Update*, the state should transition to performance-based incentives to promote more cost-effective public funding in terms of long-term energy generation per dollar of incentive support. A truly sustainable solar program will pay for kWhs produced rather than for system installation with no measure of performance to ensure that systems are appropriately installed and functioning correctly.[55]
>
> Also, the Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update* directed the state to "include agricultural applications in the mix of home and business applications of solar power that the state encourages."[56] In addition, AB 515 (Richman), Chapter 368, Statutes of 2005, provides further support for solar energy development by promoting the

installation of PV generation in open spaces above and along 660 miles of open canals and pipelines on the State Water Project.[57]

In addition, federal revenue sources for emerging renewables have changed as a result of the U.S. Energy Policy Act of 2005 (section 1335 and section 1337).[58] Homeowners can receive a tax credit for 30 percent of the cost of a PV system not to exceed $2,000. Businesses can receive a credit of up to 30 percent of the cost of an installed PV system. These tax credits apply to systems completed in 2006 or 2007 but exclude solar systems used for swimming pools or hot tubs.

Similar federal tax credits are available for homeowners and businesses installing fuel cells, although the maximum tax credit a homeowner can receive is $500 for each half kW. Businesses can claim a 30 percent investment tax credit for qualified fuel cell equipment.

Recommended Allocation for Emerging Renewables

Consistent with recent years' expenditures from the ERP, we recommend allocating 48 percent of the funds collected between January 1, 2007, and January 1, 2012, for incentives to support either the Governor's Million Solar Roofs Initiative or the California Solar Initiative, as well as non-solar emerging renewables eligible for incentives through the ERP. This allocation is estimated to provide about $360 million for five years. Subtracting the $60 million borrowed forward pursuant to AB 135, this would provide $300 million, an average of about $60 million per year.

In fiscal year 2004-2005, the Energy Commission paid about $55.9 million for rebates for more than 4,100 completed projects located in IOU service areas, compared to $70.1 million for about 4,360 systems in fiscal year 2003-2004.[59]

This amount of funding is anticipated to support a growing number of PV systems, as rebate levels decline to match expected reductions in PV system costs. Incentives for PV would be provided consistent with the CSI report adopted by the CPUC on January 12, 2006. ERP funds would also continue to provide incentives for other currently eligible emerging renewable technologies, including small wind.

The adopted CSI report recommends up to $2.9 billion in incentives for a range of solar technologies. The CSI report recommends $2.5 billion from the CPUC for 2007-2016 and up to $350 million from the Energy Commission's Renewable Energy Program. The Energy Commission's portion of the CSI is limited to new construction residences. Most of the $300 million to be allocated and available for the ERP beginning in 2007 would provide incentives for PV consistent with the CSI, but some of the funds would provide incentives for ERP-eligible technologies outside of the CSI program. In addition, a large portion of the $30 million allocated for consumer education would support the information and marketing for the Energy Commission's part of the CSI. Allocation for consumer information and market support for the

Energy Commission's portion of the CSI is discussed in Chapter 5. The Energy Commission will also provide funding for administrative support for the new construction residential portion of the CSI.

Active Solar Heating, Ventilation, and Air-Conditioning

At the November 14, 2005 workshop, an industry representative requested ERP support for metered, electricity-displacing, active solar heating, ventilation, and air-conditioning (HVAC) technologies. We recommend the Legislature define the parameters for eligibility of metered, electricity-displacing solar HVAC systems in the ERP, recognizing the intent of the program to transition to performance-based incentives.

For example, we recommend that the Legislature specify that electricity-displacing residential solar HVAC systems may be eligible for performance-based incentives under appropriate conditions, provided the technology satisfies the following criteria, as determined by the Energy Commission. The current criteria contained in the ERP guidebook for adding technologies are shown below, with suggested legislative revisions in underline/strikeout.

> New renewable-fueled electricity-displacing active heating, ventilation, and air-conditioning (HVAC) or electricity generating technologies may be added by petitioning the Energy Commission through the appropriate Committee. Applicants must submit the proper documentation satisfying of all of the following criteria:
>
> 1. Financial assistance is required for these renewable-fueled electricity-displacing active HVAC or electricity generating technologies to become commercially viable.
>
> 2. The renewable-fueled electricity-displacing active HVAC or electricity generating technology must be commercially available with at least one vendor available ~~for the sale of~~ to sell the system.
>
> 3. Vendors of any ~~generating~~ systems employing the renewable-fueled electricity-displacing active HVAC or electricity generating technology must offer at least a five-year full warranty on the entire ~~generating~~ system.
>
> 4. The renewable-fueled electricity-displacing active HVAC or electricity generating technology must show at least one year of demonstrated reliable, predictable, and safe performance by a full-scale facility using this technology under field conditions.

5. The available data must show that ~~generating~~ systems using the renewable-fueled electricity-displacing active HVAC or electricity generating technology have a useful design life of at least 20 years.

6. The renewable-fueled electricity-displacing active HVAC or electricity generating technology must be designed so that it can displace grid-connected electricity used for heating, ventilation, or air-conditioning or produce grid-connected electricity.

7. The technology represents a new renewable-fueled electricity-displacing active HVAC or electricity generating process not well represented among existing grid-connected renewable generating facilities, rather than some evolutionary or incremental improvements to renewable technologies used in existing renewable resource technology generating facilities (examples of such evolutionary or incremental improvements will be: a) an improved blade design for wind turbines, b) less expensive well drilling techniques for geothermal, or c) a more efficient burner design for a biomass plant).

8. The project must be designed exclusively for the purpose of producing or displacing electricity for on-site use or sale (excluding demonstration projects that may sell to one specific customer), in contrast to a research or demonstration facility, which is designed primarily for collecting additional research data.

9. The system must use metering capable of measuring actual electricity generation or its equivalent in terms of HVAC electricity displacement.

10. The renewable-fueled electricity-displacing active HVAC system must operate while connected to the electricity transmission and distribution grid.[60]

The proposed allocation of funds for 2007-2012 transfers money from the discontinued Customer Credit Program element to the ERP to support the Governor's Million Solar Roofs Initiative or California Solar Initiative. The proposed allocation would also shift some money from the NRFP and the ERFP to reflect changing market conditions that have reduced the need for funding in those programs.

We recommend using the program's guidebook development and revision process to provide the flexibility to move funds out of the ERP to other elements of the Renewable Energy Program in response to changing market needs.

Fuel Cell Technologies

We recommend that fuel cell technologies using renewable fuels and less than 30 kW in size continue to be eligible for ERP funding. Since 1998, two phases of a renewable fuel cell project at the Las Virgenes Municipal Water District in Calabasas received rebates from the ERP program: in 1999, the first 186 kW system received a rebate for $500,000 ($2.68 per watt); and the second 214 kW system received a rebate for about $460,000 ($2.15 per Watt).[61] Currently, the ERP rebate level for renewable fuel cells is $3.20/Watt and is limited to systems under 30 kW in size.

To avoid overlap with the CPUC Self-Generation Incentive Program (SGIP), which began in 2001 and is scheduled to end in 2007, the ERP no longer allocates funds for systems 30 kW or larger. Distributed generation systems ranging from 30 kW to 1 MW using renewable fuel cell technologies are eligible for Level 1 funding ($4.50 per Watt) under the CPUC's SGIP. In addition, non-renewable fuel cell technologies are eligible for Level 2 funding ($2.50 per Watt) under the CPUC's program. If a project receives a rebate from another source, it will receive a reduced rebate from the SGIP.[62] Through December 2004, two completed non-renewable fuel cell projects totaling 800 kW installed capacity received $2 million ($2.50 per Watt) in rebates from the CPUC's SGIP.[63] In 2005, two completed renewable fuel cell projects totaling 750 kW installed capacity received about $3.38 million ($4.50 per Watt). Also in 2005, one completed natural gas fuel cell project totaling 1,000 kW installed capacity received about $2.46 million (about $2.46 per Watt).[64]

Fuel cells are also identified as a potential source of hydrogen for the transportation sector. The California Hydrogen Highway Network, the state initiative to develop the infrastructure for wide-scale use of hydrogen as a transportation fuel in California, has set a goal of using 20 percent renewables in the production of hydrogen for transportation uses. Other goals include reducing greenhouse gas emissions from California's transportation sector by at least 30 percent and avoiding the increased emission of toxic pollutants or pollutants that contribute to smog relative to fossil fuel vehicle use.[65]

The RESIA directs the Energy Commission to recommend an allocation to "specified fuel cell technologies, if the Commission makes all of the following findings:

> A) The specified technologies have similar or better air pollutant characteristics than renewable technologies in the investment plan.
>
> B) The specified technologies require financial assistance to become commercially viable in reference to wholesale generation prices.
>
> C) The specified technologies could contribute significantly to the infrastructure development or other innovation required to meet the long-term objective of a self-sustaining, competitive supply of renewable energy."

Because renewable fuel cells are properly included as “emerging renewable technologies” under the RESIA, the term “specified fuel cell technologies” is assumed to refer to other fuel cell technologies, including fuel cells that use fossil fuels such as propane, methanol, or natural gas. Since the predominant fuel today for fuel cells is natural gas, we will use the term “natural gas fuel cell” to refer to the “specified fuel cell technologies.”

In the Energy Commission’s prior renewable energy investment plan, *Investing in Renewable Energy Generation in California* (2001), incorporated into law as part of SB 1038, the Energy Commission assessed non-renewable fuel cell technologies according to the above criteria and made the following findings (pp. 62-63, footnotes omitted):

- Natural gas fuel cells in cogeneration applications have similar criteria air pollutant characteristics as the renewable technologies in the investment plan, while non-cogeneration applications have higher emissions of global warming potential gases.

- Natural gas fuel cells are not currently commercially viable by reference to wholesale generation prices, and therefore require public funding assistance. However, financial assistance is expected to be available to these fuel cells through two separate programs – the … [CPUC’s SGIP] under Assembly Bill 970 and the Energy Commission’s Solar Energy and Distributed Generation Grant Program under Senate Bill 1345. The Commission believes that when the CPUC funds become available, they should be the first source of funding for non-renewable fuel cell technologies. Consequently, though non-renewable fuel cell technologies in cogeneration applications are eligible for funding, the Commission allocates no further assistance to these technologies from RESIA funds at this time. The Commission will monitor these other programs to determine whether the support provided to specified technologies is sufficient and, if not, will recommend funding for these technologies in the future.

- Natural gas fuel cells have the potential to contribute to long-term renewable infrastructure development in several ways. Most directly, development of natural gas fuel cells would tend to bring down the costs of renewable fuel cells, since the technology is the same. Other, more indirect, potential contributions are either well in the future or are likely to be accomplished by other technologies.

We believe these findings remain valid for the 2007-2011 period covered by this investment plan. While non-renewable fuel cell technologies satisfy RESIA criteria for potential allocations of funding, the Energy Commission believes that these technologies should be funded through the CPUC’s SGIP, rather than the ERP. Allocations of RESIA funding for the ERP should be restricted to eligible emerging renewable technologies. The demand for these limited funds is expected to be high

in light of the Governor's Million Solar Roofs Initiative and the California Solar Initiative.

The Energy Commission will continue to monitor the funding for non-renewable fuel cells under the CPUC's SGIP, as well as other programs, to determine if it is adequate, and if not, will recommend funding for this technology in the future.

Chapter 3 Endnotes

[55] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/, accessed December 6, 2005, p. 125.

[56] California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 5.

[57] California Energy Commission, November 2005, *2005 Integrated Energy Policy Report*, *Commission Final Report*, CEC-100-2005-005-CTF, http://www.energy.ca.gov/2005_energypolicy/, accessed December 6, 2005, p. 125.

[58] Public Law 109-58 (HR 6). Section 1335 is available at http://www.dsireusa.org/documents/Incentives/US37F.htm, and section 1337 is available at http://www.dsireusa.org/documents/Incentives/US02Fa.htm accessed October 15, 2005.

[59] California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, http://www.energy.ca.gov/renewables/quarterly_updates/, November 2005, p. 24.

[60] Public Resources Code section 25744(b)(3) lists the technologies eligible for the ERP as follows:

> Eligible distributed emerging technologies are photovoltaic, solar thermal electric, fuel cell technologies that utilize renewable fuels, and wind turbines of not more than 50 kilowatts rated electrical generating capacity per customer site, and other distributed renewable emerging technologies that meet the emerging technology eligibility criteria established by the Energy Commission. Eligible electricity generating systems are intended primarily to offset part or all of the consumer's own electricity demand, and shall not be owned by local publicly owned electric utilities, nor be located at a customer site that is not receiving distribution service from an electrical corporation that is subject to Section 381 and contributing funds to support programs under this section. All eligible electricity generating system components shall be new and unused, and shall not have been previously placed in service in any other location or for any other application, and shall have a warranty of not less than five years to protect against defects and undue degradation of electrical generation output. Systems and their fuel resource shall be located on the same premises of the end-use consumer where the consumer's own electricity demand is located, and all eligible electricity generating systems shall be connected to the utility grid in California. The Energy Commission may require eligible electricity generating systems to have meters in place to monitor and measure a system's performance and generation. Only systems that will be operated in compliance with applicable law and the rules of the commission shall be eligible for funding.

Current criteria for adding technologies to the ERP are listed in California Energy Commission, November 2005, *Proposed Draft Guidebook: Emerging Renewables Program Guidebook, Sixth Edition.* CEC-300-2005-001-ED6D, http://www.energy.ca.gov/2005publications/CEC-300-2005-001/CEC-300-2005-001-ED6D.PDF, Appendix 3. This section of the proposed draft guidebook remains unchanged from the current ERP Guidebook. S.O.L.I.D. USA states that its solar HVAC systems are not interconnected with the electricity grid; however, other companies indicate that the technology can be designed to use grid-electricity for the pumping aspect of the system or generate grid-connected electricity. See S.O.L.I.D. USA, INC. October 14, 2005, "Comments on Committee Draft Documents Hearings," in Docket No: 04-IEP-1K, in the matter of the *2005 Integrated Energy Policy Report*, http://www.energy.ca.gov/2005_energypolicy/documents/2005-10-11_DER_comments/10-14-05_SOLID_USA_Inc_Comments.pdf, p. 3. See also, Solargenix Energy, "Building Division: Power Roof™ Systems," http://www.solargenix.com/powerRoof.cfm. And see, So Cool Energy, Inc., 2004, "Solar Air Conditioning," http://www.cc.state.az.us/utility/electric/EPS-SACH.pdf, slide 13; In 2004, Arizona incorporated solar HVAC systems into its renewable portfolio, see November 10, 2004, "Arizona Approves Solar HVAC Pilot Program: First State to Include Solar

HVAC in Renewable Portfolio," *Renewable Energy Access*, http://www.renewableenergyaccess.com/rea/news/story?id=18582, accessed December 21, 2005.

[61] California Energy Commission, March 2000, *Annual Project Activity Report to the Legislature: Renewable Energy Program*, P500-00-004, http://www.energy.ca.gov/reports/2000-03-15_500-00-004.PDF, accessed December 23, 2005, p. C-4. See also, Las Virgenes Municipal Water District, October 27, 1999, "Local Water Agencies begin Generating Electric Power from Human Waste Byproducts: First Installation of its Kind in California - Fourth in Nation," News Release, http://www.lvmwd.dst.ca.us/hot/hot3_102799.html, accessed December 30, 2005.

[62] April 23, 2005, *Self-Generation Incentive Program Handbook, Revision 1*, http://www.sdenergy.org/uploads/Selfgen%20SGIP%20Handook%20-%20r1%20-%20050423.pdf, accessed December 21, 2005, p. 3-23. Regarding the way other incentives affect the calculation of SGIP rebates, the SGIP handbook states: "Projects receiving incentives from the CEC Emerging Renewables Program or any performance based incentive (PBI) program, including those offered under the CEC pilot PBI, are ineligible for SGIP. For projects receiving self-generating incentives under other programs, the SGIP incentive may be reduced, depending on the source of the other incentive, to effectively allow only part of the other program incentive in addition to the SGIP incentive" p. 3-24.

[63] Itron, Inc., April 15, 2005, *CPUC Self-Generation Incentive Program Fourth-Year Impact Report*, CPUC Rulemaking 04-03-017 and 98-07-037, http://www.cpuc.ca.gov/static/energy/electric/050415_sceitron+sgip2004+impacts+final+report.pdf, accessed December 16, 2005, p. 4-5 and 4-9.

[64] San Diego Regional Energy Office, November 2005, "Statewide Self-Generation Incentive Program Data," http://www.sdreo.org click on "SGIP Data & Reports," accessed January 3, 2006.

[65] California Environmental Protection Agency, December 8, 2005, *DRAFT Climate Action Team Report to the Governor and Legislature*, http://www.climatechange.ca.gov/climate_action_team/reports, p. 40.

CHAPTER 4: EXISTING RENEWABLE FACILITIES PROGRAM

Under SB 1038, the ERFP pays incentives to eligible biomass, solar thermal, and wind energy facilities to provide support while they move to a competitive market for their renewable energy products. Publicly available information indicates that existing wind facilities receive enough revenue from other sources to cover their needs; however, eligible existing central-station solar thermal electric and solid-fuel biomass warrant continued support, although at a lower level than provided in SB 1038. Progress to increase the competitiveness of biomass in the electricity, transportation, and municipal solid waste reduction markets has been stymied by a failure to coordinate policy development across these sectors.

California has significant biomass and biogas resources, with about 600 MW of solid-fuel biomass and 250 MW biogas generating capacity accounting for 2 percent of the state's electricity in 2004. Because they are properly configured to control nitrous oxide emissions and minimize the environmental impacts of transporting waste materials used as fuel, solid-fuel biomass electricity generating facilities operating in California have strategic value as a renewable resource that can help meet the state's RPS goals while also capturing social, economic, and environmental benefits and improving transmission reliability.

There are 28 existing solid-fuel biomass electricity-generating facilities participating in the ERFP.[66] In addition, several offline biomass electricity-generating facilities have indicated an interest in restarting, provided they can secure sufficient revenue and ample fuel sources.

Policy Context

The intent of the ERFP is to foster a self-sustaining market for existing renewable energy facilities. Toward that end, the ERFP plans to lower incentive levels over time. Regarding biomass, SB 1194 states that to help increase the competitiveness of electricity generated from biomass, the program should provide:

> Incentives for reducing fuel costs that are confirmed to the satisfaction of the Energy Commission at solid fuel biomass energy facilities in order to provide demonstrable environmental and public benefits, including, but not limited to, air quality.[67]

Originally, support for existing renewables was planned for only four years and was to be phased out by 2002. According to the 1997 *Policy Report on AB 1890 Renewables Funding*, "the proposal aims to maintain the benefits of the renewables industry by providing support that reflects industry needs, while encouraging

movement toward a competitive market by the end of the AB 1890 funding period."[68] However, SB 1038 extended the program for an additional four years. It has taken longer than anticipated to aid existing renewables through their transition to reduce costs and renegotiate contracts to generate sufficient revenues to meet their needs.

In his response to the *2003 Energy Report*, Governor Schwarzenegger emphasized the importance of competitive processes as a central principle of the state's renewable energy policy. In addition, the Governor stated that he expects the following to be used as the basis for developing energy-related policy for biomass:

> I support the Biomass Collaborative and its potential for contributing to the diversity of energy resources and have reinvigorated the Interagency Working Group, composed of state agencies with important biomass connections, to develop an integrated and comprehensive state policy on biomass. This policy should include electricity, natural gas, and petroleum substitution potential. It should also reflect the substantial potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. The Energy Commission's Public Interest Energy Research program should support this initiative.[69]

An integrated approach to convert biomass waste to fuel for both electricity and transportation takes on added importance in the context of the Governor's greenhouse gas (GHG) reduction goals to lower GHG emissions to 2000 levels by 2010; reduce GHG emissions to 1990 levels by 2020; and reduce GHG emissions to 80 percent below 1990 levels by 2050.[70] When living, biomass draws carbon dioxide from the air. This carbon dioxide is released when the biomass decays, burns, or is used to generate electricity. For this reason, biomass is considered to have a net zero effect on carbon dioxide emissions. If fossil fuels are used to transport biomass, then a net increase in carbon dioxide emissions results. If transportation fuels derived from biomass or other renewable energy sources are used to haul biomass fuels, this impact can be reduced.

The industry points out that methane and hydrocarbons are emitted from solid-fuel biomass when burned in an uncontrolled process. Controlling their release is one of the environmental benefits of the controlled-combustion of solid-fuel biomass.[71]

In addition, accelerating the use of biomass to generate electricity is identified as part of the proposed fire fuels management strategy in the *Draft Climate Action Team Report to the Governor and Legislature.* In the draft work plan for this proposed fire fuel management strategy, biomass generators are described as a way to develop new markets for "low value and small diameter trees."[72]

Recommended Allocation

We recommend that 10 percent (estimated to be about $75 million) of the funds collected between January 1, 2007, and January 1, 2012, be allocated to the ERFP for existing solid-fuel biomass facilities and existing central-station solar thermal electric facilities. While we do not recommend allocating funds for existing wind energy facilities at this time, the Committee recommends flexibility to do so in the future if market conditions change.

This recommendation is based on the level of payments from the ERFP during the past few years, the need for some continued support for existing solar thermal electric facilities, estimates of solid-fuel biomass costs, the availability of the federal production tax credit (PTC) to solid-fuel biomass, and the availability of capacity payments to support biomass operation during summer peak and partial peak hours.

While the Committee recommends that funding be allocated for existing solid-fuel biomass and central-station solar thermal electric facilities, it recognizes that some of these facilities may not need financial assistance because of their particular circumstances and the revenues they receive under their power purchase agreements. Consequently, the Committee recommends that the Energy Commission retain authority to set appropriate incentive levels for eligible facilities consistent with SB 183.

In addition, we recommend a legislative change to allow funds to be added to the Existing Renewable Facilities Program to maintain maximum flexibility to respond to market conditions.

Recent Incentive Payments to Eligible Existing Renewable Energy Facilities

Existing wind facilities have been competitive during the past two fiscal years and have not required incentives from the ERFP. About $1 million was paid to wind in 2003 for generation in 2002, but no payments were made in 2004 or 2005 to date.

In fiscal year 2004-2005, $18.3 million was paid to eligible existing renewable biomass and solar thermal facilities. Similar amounts were paid over the two previous fiscal years. Payments for solid-fuel biomass facilities for calendar year 2004 were about $17 million. For calendar year 2003, solid-fuel biomass facilities received about $16 million. Payments for existing solar thermal electric facilities for calendar year 2004 were about $1.5 million. For calendar year 2003, solar thermal facilities received about $1.4 million.

Existing Central-Station Solar Thermal Electric Facilities

The RESIA directs the Commission to determine whether funding should be allocated to solar thermal generating resources that enhance the environmental value or reliability of the electricity system and require financial assistance to remain economically viable. Since peak output from solar thermal electric facilities corresponds with peak electrical demand, these facilities provide a clean source of reliable capacity when it is most needed. The problems associated with ground level pollution or smog are most prevalent when temperatures increase, which also corresponds with a greater demand for electricity. Because of the nature of their primary fuel (the sun), solar thermal electric facilities tend to operate near full capacity during these times, providing substantial system reliability while producing low amounts of pollution.

In the 1997 *Policy Report on AB 1890 Renewables Funding*, the Energy Commission determined that solar thermal electric facilities required assistance at a level similar to that of biomass facilities. This finding was reiterated in the Energy Commission's prior renewable energy investment plan, *Investing in Renewable Energy Generation in California* (2001), which was incorporated into SB 1038. However, over the past few years, we have observed greater financial self-sufficiency among most of the existing solar thermal electric facilities relative to solid-fuel biomass to indicate that they require different financial assistance than biomass requires.[73]

Estimates of Levelized Cost of Electricity for Solid-Fuel Biomass

The *Biomass Strategic Value Analysis – Draft Staff Paper* estimated the trend in the levelized cost of electricity from a new 25-MW solid-fuel biomass fluidized bed combustor. Converting the constant dollar estimates to 2005 dollars, solid-fuel biomass fluidized bed combustor without PTC is estimated to be 7.1 cents/kWh for new plants online in 2005. The levelized cost of electricity is estimated to be 6.9 cents/kWh for 2007, 5.9 cents/kWh for 2010, and 5.3 cents/kWh in 2017. [74] In contrast, the industry states that a new biomass facility built in California today would have an average cost of production of more than 8 cents/kWh, and the average cost of power production for existing plants is more than 7 cents/kWh.[75] Levelized costs for existing plants, some of which have been operational for almost 20 years, should be lower than new plants online in 2005 because debt incurred for capital costs should be nearly repaid.

Excluding ERFP incentives and the PTC, the staff estimates that existing solid-fuel biomass facilities receive between 7.37 to 7.87 cents/kWh on average from energy and capacity payments.[76] This exceeds the estimated levelized costs for new 2005 solid biomass plants by 4 to 10 percent. In addition, a handful of electricity-generating facilities, including facilities that re-started during the energy crisis, are

currently operating at revenue levels that are 1.5 to 2 cents/kWh less than the revenue that most existing biomass facilities receive.

Federal Production Tax Credit for Open-Loop Solid-Fuel Biomass

Furthermore, all open-loop (fueled by organic waste materials, rather than dedicated crops) biomass facilities are eligible for the federal PTC for five years starting in 2005. The PTC is anticipated to provide open-loop biomass facilities approximately 0.45 cents/kWh or 0.9 cents/kWh, depending on criteria specified in the law. These credits are adjusted annually. [77] For comparison, average payments from ERFP during the past 12 months range from 0.33 cents/kWh to 1 cent/kWh.

The Federal PTC for wind and closed-loop (fueled by crops grown for this purpose) biomass is 1.9 cents/kWh for generation in 2005; however, as of October 2005, there are no closed-loop biomass facilities in the United States.

Capacity Payments Support Biomass Operation in Summer Months

Based on third-party verified data submitted by biomass facilities, staff has calculated that average annual capacity payments for biomass facilities range from 2 cents/kWh to 2.5 cents/kWh. The majority of these payments are provided during the summer months for generation during peak and partial peak hours.

Facilities need to operate the majority of the summer peak and partial peak hours to receive their full capacity payments. The biomass facilities are therefore likely to operate during these time periods regardless of whether they receive any additional incentives. Summer peak and partial peak capacity payments are equivalent to about 10 cents/kWh, providing a substantial increase in revenue during these periods.

Chapter 4 Endnotes

[66] Twenty-eight solid-fuel biomass facilities are currently participating in the ERFP. There are 22 existing solid-fuel biomass facilities under PG&E standard offer contracts and all but one are Standard Offer 4 (SO4) contracts. The one that does not have an SO4 contract had an SO4 contract previously, but it expired. Now this facility has a Standard Offer 1 contract, which is based on the short-run avoided cost for energy (SRAC). About five years ago, facilities holding SO4 contracts were offered a fixed price for energy payments of 5.37 cents/kWh as a five-year amendment to their contracts. Of the 21 PG&E facilities that have SO4 contracts, 20 are paid under this option and one is paid according to the SRAC. The SRAC is currently high; for example, in September 2005, the SRAC for PG&E was 7.79 cents/kWh. The SRAC changes monthly. In addition to the 22 standard offer contracts with PG&E, one biomass facility is under a SO4 contract with SCE, and one facility has a pre-1996 contract with Sierra Pacific Power. In addition, there are four existing biomass facilities with post-1996 contracts: three re-started biomass facilities have negotiated contracts with PG&E, and one facility has a contract with SDG&E.

[67] SB 1194 (Sher), Chapter 1050, Statutes of 2000, http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_1151-1200/sb_1194_bill_20000930_chaptered.pdf, accessed October 25, 2005.

[68] As a result of the Energy Crisis of 2000-2001, California has developed a hybrid market to avoid possible excesses from either an oligopolistic or fully competitive market for the provision of electricity. Although the state's electricity market is not fully competitive, the state's load-serving entities offer contracts to independent renewable energy providers through all source and RPS competitive solicitations, fixed-price and variable-price standard offer contracts, and negotiated bilateral contracts. See California Energy Commission, March 1997, *Policy Report on AB 1890 Renewables Funding, Report to the Legislature,* P500-97-002, http://www.energy.ca.gov/reports/1997_AB1890_RPT2LEGI.PDF, accessed October 19, 2005.

[69] Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005

[70] California, Office of the Governor, June 1, 2005, Executive Order S-3-05, http://www.governor.ca.gov/state/govsite/gov_homepage.jsp, click on "Press Room," accessed October 15, 2005.

[71] Biomass Energy Alliance, LLC., letter to the Renewables Committee, California Energy Commission, regarding the Draft 2006 Renewable Energy Investment Plan – Docket #00-REN-1194, http://www.energy.ca.gov/renewables/investmentplan/documents/2005-11-14_workshop/comments/, accessed December 16, 2005.

[72] California Environmental Protection Agency, December 8, 2005, *Draft Climate Action Team Report to the Governor and Legislature*, [http://www.climatechange.ca.gov/ climate_action_team/reports], pp. 49-50. The draft work plan for this strategy includes the following recommendation: "Through the Interagency Bioenergy Workgroup and other forums, develop an action plan by March 2006 to meet the 175,000 acre forest sector biomass development target. The plan should identify and address the principal barriers to development of forest sector biomass projects, including securing reliable supplies from the Forest Service, and provide incentives to encourage new markets for low value and small diameter trees." See California Climate Action Team, December 8, 2005, *Draft State Agency Work Plans*, http://www.climatechange.ca.gov/climate_action_team/reports/2005-12-08_AGENCY_WORKPLANS.PDF, p. 105.

[73] See Sunray Energy, Inc, November 21, 2005, "Comments of Sunray Energy, Inc." No other existing solar energy project participating in the ERFP filed comments on the staff draft *2006 Renewable Energy Investment Plan*. See also, California Biomass Energy Alliance, LLC., letter to the Renewables Committee, California Energy Commission, regarding the Draft 2006 Renewable Energy Investment Plan – Docket#00-REN-1194, http://www.energy.ca.gov/renewables/investmentplan/documents/2005-11-14_workshop/comments/, accessed December 16, 2005.

[74] California Energy Commission, June 2005, *Biomass Strategic Value Analysis – Draft Staff Paper* http://www.energy.ca.gov/2005publications/CEC-500-2005-109/CEC-500-2005-109-SD.PDF,

accessed October 15, 2005, pp. 56, 60. For comparison, levelized cost of electricity estimates prepared by Navigant in the *Renewable Resources Development Report*, Appendix D, converted to 2005 dollars using the estimated GDP inflator are as follows: solid biomass direct combustion, without PTC (2005 dollars) is estimated to be about 6.8 cents/kWh for new plants online in 2005. The levelized cost of electricity is estimated to be 6.4 cents/kWh for 2008 and 2010, dropping to 5.8 cents/kWh in 2017. See http://www.energy.ca.gov/renewables/02-REN-1038/documents/index.html, Appendix D.

[75] California Biomass Energy Alliance, LLC., letter to the Renewables Committee, California Energy Commission, regarding the Draft 2006 Renewable Energy Investment Plan – Docket#00-REN-1194, http://www.energy.ca.gov/renewables/investmentplan/documents/2005-11-14_workshop/comments/, accessed December 16, 2005.

[76] The estimated revenue is based on PG&E SO4 Power Purchase Agreements with average fixed energy payments of 5.37 cents/kWh, plus capacity payments of 2 cents/kWh to 2.5 cents/kWh.

[77] US Energy Policy Act of 2005 [Public Law 109-58 (HR6), Section 1301.]

CHAPTER 5: CONSUMER EDUCATION PROGRAM

The Consumer Education Program has provided California consumers with information about renewable energy and its benefits through public service announcements, events, radio, television, newspaper and magazine articles, and informational materials for consumers, builders, installers, and public officials. This program has provided funds totaling more than $5 million for market research, 21 outreach and demonstration project grants, and two public awareness campaign contracts. In addition, Customer Credit funds reallocated to the Consumer Education Program have been used to launch the Western Renewable Energy Generation Information System (WREGIS). WREGIS will use RECs to track renewable generation and procurement. Delivery of procured RPS energy from out of state to California will be tracked separately.

Under SB 1038, 1 percent of the RRTF funds collected between January 1, 2002, and January 1, 2007, were allocated to this element of the Renewable Energy Program, approximately $5.4 million over five years. In response to the CPUC's decision to limit direct access, approximately $5 million from the Customer Credit Program has been redirected to this program.

We recommend changing the name of the Consumer Education Program to the Consumer Information and Market Support Program.

Policy Context

Sustainable Solar Market Development

The Governor has set a goal, consistent with previous administrations, of achieving a sustainable solar energy market. Moreover, the Governor has set specific numerical targets for the installation of 1 million solar energy systems or the equivalent of 3,000 MW by 2018.[78] The CPUC CSI report adopted January 12, 2006, states that the goal will be reached with DG PV systems supplying electricity for on-site use, as well as other eligible distributed solar systems.

California has been providing incentives for the installation of DG PV in IOU service territories since 1998 through the Energy Commission's ERP and since 2001 through the CPUC's SGIP.

As of September 30, 2005, there was a total of about 16,000 PV systems installed in California, representing 130 MW. Of these, about 14,400 PV systems were installed in IOU service areas, with 97 percent (45 percent of the total MW) receiving support from the ERP and 3 percent (32 percent of the total MW) receiving support from the

CPUC SGIP. The remaining 1,600 systems (23 percent of the total capacity) were installed in POU service areas.

To reach the Governor's numerical goal, California will have to install, on average, almost 300 MW per year of DG PV and other eligible distributed solar systems for the next 10 years. The number of systems installed, however, would likely follow an exponential growth curve with fewer systems installed in the early years and a greater number of systems installed in the later years. Depending on how incentive programs are structured, achieving these numerical targets may or may not lead to the ultimate goal of a sustainable solar energy market.

Thus far, leading edge individuals, builders, and commercial businesses have helped California reach current levels of installed DG PV. These parties are well positioned to build on their current knowledge to help the state reach the new target; but to reach this ambitious goal, many newcomers are needed as well. More consumer information and market support activities are needed to encourage and assist these newcomers to enter the solar energy market and to provide continued assistance to current market participants.

Western Renewable Energy Generation Information System

We also recommend continuing to use funds from this program element to support the WREGIS. The WREGIS is being developed in response to SB 1078, which requires the Energy Commission to:

> Design and implement an accounting system to verify compliance with the renewables portfolio standard by retail sellers, to ensure that renewable energy output is counted only once for the purpose of meeting the renewables portfolio standard of this state or any other state, and for verifying retail product claims in this state or any other state.[79]

The WREGIS will track RECs created by the generation of RPS-eligible energy within the WECC and is expected to be operational in early 2007.

The Energy Commission plans to use North American Electricity Reliability Council (NERC) tags in conjunction with the WREGIS to verify delivery of RPS energy from out of state into California.[80] Pursuant to CPUC Decision 05-07-039, California IOUs must accept RPS energy delivered to any point within the California Independent System Operator (CA ISO) service territory and may accept RPS energy delivered into other points in California.[81] Out-of-state electricity-generating facilities are subject to the same deliverability requirements as in-state facilities. Generation that will be counted for purposes of RPS compliance from out-of-state facilities must be delivered to an in-state market hub (also referred to as "zone") or in-state substation (also referred to as "node") located within California. The specific in-state delivery location will be designated by the contracting IOU under the power purchase

contract between the IOU and facility or renewable supplier, consistent with CPUC Decision 05-07-039.

The WREGIS is being designed to track California's RPS procurement while being flexible enough to meet the REC-tracking needs of a broad range of renewable energy markets. For example, many other states and municipalities within the WECC have their own RPS programs, and the eligibility requirements differ from one program to the next.[82] In addition to these regulatory markets, there is a growing voluntary market for RECs. The WREGIS is being designed to attract as broad a range of market participants as reasonably possible by accommodating the needs of these various entities in the WECC, such as recognizing program-specific eligibility requirements. The intent is to spur robust participation and best meet California's legislative intent by tracking a broad scope of renewable energy generation.

The Governor has encouraged the Legislature to "enable a tradable credit or other system to encourage development of the vast renewable resources available throughout the West."[83] Currently the California RPS requires the tracking of energy bundled with the associated RECs used to meet the IOUs' RPS requirements. To meet this need, the Energy Commission plans to use data from WREGIS and NERC-tags to verify delivery of RPS-eligible energy to California.[84] It should be noted that the WREGIS is not being designed to provide REC-trading services.

Other Emerging Renewables

As directed by AB 1890 and subsequent legislation, the Consumer Education Program element has also prepared and distributed materials to promote the installation of non-PV emerging renewable technologies, such as small wind electricity generation systems of less than 50 kW, fuel cells that convert renewable fuels into electricity, and solar thermal. Although these non-PV technologies represent a small portion of the systems that have been funded in the ERP, they provide value by diversifying California's electricity generation technologies and fuel sources. The Consumer Information and Market Support Program element should continue to support these technologies.

Recommended Allocation

To meet the state's new policy priorities for renewable energy, we recommend allocating 4 percent of the RRTF to the Consumer Information and Market Support Program element (an increase from 1 percent under SB 1038). These funds will support training and outreach to support a growing market for ERP-eligible distributed solar in support of the Governor's goal of ramping up to 3,000 MW of distributed solar systems. These funds will also support WREGIS and other consumer information and market support activities pursuant to the guidebook for

this program element. This allocation is estimated to provide about $30 million for five years or an average of about $6 million per year.

Pursuant to the guidebook process, staff plans to develop an updated Consumer Information and Market Support Plan (Marketing Plan).[85] Initially, most of the funds are expected to be used for marketing and education materials to support the Governor's goal of reaching a sustainable solar energy market, although details regarding this program are still undecided. The remaining funds would be used to support the WREGIS, other emerging renewables, and general consumer information and marketing-building activities. A brief description of the activities undertaken for each of the elements of the Marketing Plan is provided below.

Sustainable Solar Energy Market

We anticipate that the primary activities undertaken to support the sustainable solar energy market will focus on education, solar industry integration, and facilitating standards development for solar technologies and installers. These activities will be consistent with the Governor's goal and SB 1, which is still pending before the Legislature, or the CSI program goals. As of September 2005, the draft text of SB 1 would require the Energy Commission to do the following:

- Publish educational materials designed to demonstrate how builders may incorporate solar energy systems during construction as well as energy efficiency measures that best complement solar energy systems.

- Provide assistance to builders and contractors in support of the Governor's solar roofs initiative. The assistance may include technical workshops, training, educational materials, and related research.

In addition to these core activities, a statewide PV marketing campaign may be required to reach the Governor's numerical targets for distributed solar installations. An allocation of $3 million to $7 million per year for targeted market support activities may be warranted if PV installations do not ramp up as quickly as needed to reach the Governor's goals.[86]

Western Renewable Energy Generation Information System

Although SB 1078 required the development of a tracking system for the RPS program, it did not specifically allocate funding for this purpose. Consequently, the Energy Commission has used funding from the Customer Credit Program element transferred to the Consumer Education Program element to support the WREGIS. The Committee recommends that the Energy Commission's authority under the Consumer Education Program be clarified to explicitly address the WREGIS.

Other Emerging Renewables

We also plan to conduct activities to support other emerging renewable technologies, including distributed generation wind, fuel cells, and solar thermal electric. We anticipate conducting training, education, and outreach for local building department personnel and inspectors, building contractors, installers, and engineers. These activities will likely lower the costs, reduce delays, and improve the installation quality of wind, fuel cell, and other technologies included in this element.

General Consumer Information and Market Support

The Renewable Energy Program may be called upon to provide information, research, evaluation, or market support activities that fall outside of the other activities under this program element but would rightly fall within this program's purview and objectives. Therefore, to provide program flexibility and organization, we recommend creating a General Consumer Information and Market Support component of this program.

Needed Flexibility

We recommend maintaining the flexibility to reallocate funds from Consumer Information and Market Support to other elements of the Renewable Energy Program in response to market conditions.

Chapter 5 Endnotes

[78] As of September 2005, both SB 1 (Murray), regarding the Governor's Million Solar Roofs Initiative, and the CPUC's Solar Assigned Commissioner Ruling R.04-03-017 included these goals.
[79] Public Utilities Code section 399.13, subd.(b).
[80] See California Energy Commission, August 2004, *Renewables Portfolio Standard Eligibility Guidebook*, http://www.energy.ca.gov/portfolio/documents/guidebooks/2004-08-20_500-04-002F1.PDF, accessed October 12, 2005, pp. 18-19. The Energy Commission plans to update the guidebook to be consistent with Decision 05-07-039 in January 2006.
[81] CPUC, July 21, 2005, *Opinion Approving Procurement Plans and Requests for Offers for 2005 RPS Solicitations*, Rulemaking 04-04-026, http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/48266.doc, accessed October 12, 2005, pp. 7-11, 41-42.
[82] For information on RPS programs in other states, see the Database of State Incentives for Renewable Energy, http://www.dsireusa.org. For information on publicly owned utility RPS programs in California, see California Energy Commission, November 2005, *Publicly Owned Electric Utilities and the California RPS: A Summary of Data Collection Activities, Consultant Report*, prepared by KEMA, Inc.,CEC-300-2005-023, [http://www.energy.ca.gov/2005publications/CEC-300-2005-023/CEC-300-2005-023.PDF].
[83] California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 6.
[84] For information on NERC's e-tag system, see "NERC Electronic Tagging Version 1.7 Home Page," http://reg.tsin.com/Tagging/e-tag/, accessed October 12, 2005.
[85] Energy Commission, February 1999, *Renewable Energy Consumer Education Marketing Plan*, P500-99-018, [http://www.energy.ca.gov/renewables/documents/1999-02-05_MKTG_PLAN.PDF], accessed October 19, 2005.
[86] California Energy Commission, October 30, 2000, *Renewable Energy Program Preliminary Evaluation, Consultant Report*, prepared by Regional Economic Research, Inc. This independent evaluation of the Renewable Energy Program, recommended an allocation of $3 million to $7 million per year at a minimum to successfully carry out a multi-faceted approach to developing a consumer market for renewable energy in California. Although this evaluation referenced green energy marketing, staff anticipates that a statewide marketing campaign in support of a sustainable solar market on the scale of the Governors goal would likely require a similar outlay of funds.

ACRONYMS

CA ISO	California Independent System Operator
CCA	community choice aggregator
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DG	distributed generation
EIA	Energy Information Administration
ERFP	Existing Renewable Facilities Program
ERP	Emerging Renewables Program
ESP	electric service provider
GHG	greenhouse gas
HVAC	heating, ventilation, and air-conditioning
IOU	investor-owned utility
kW	kilowatt
LADWP	Los Angeles Department of Water and Power
LNG	Liquefied Natural Gas
Mcf	thousand cubic feet
MMcfd	million cubic feet per day
MPR	market price referent
MW	megawatt
NERC	North American Electric Reliability Council
NRFP	New Renewable Facilities Program
PG&E	Pacific Gas and Electric Company
PTC	production tax credit
POU	publicly owned utility
PV	photovoltaic
REC	renewable energy certificate
RESIA	Reliable Electric Service Investments Act
RFO	request for offer
RPS	Renewables Portfolio Standard
RRTF	Renewable Resource Trust Fund
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SEP	supplemental energy payment
SGIP	Self-Generation Incentive Program
SMUD	Sacramento Municipal Utility District
SRAC	short run avoided cost
SO4	standard offer 4
WECC	Western Electricity Coordinating Council
WREGIS	Western Renewable Generation Information System

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