# BIOENERGY ACTION PLAN FOR CALIFORNIA:

# PROGRESS to PLAN

Prepared for the Bioenergy Interagency Working Group:

*Air Resources Board*
*California Energy Commission*
*California Environmental Protection Agency*
*California Resources Agency*
*California Department of Food & Agriculture*
*Department of Forestry and Fire Protection*
*Department of General Services*
*Integrated Waste Management Board*
*Public Utilities Commission*
*Water Resources Control Board*

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# State of California
# Bioenergy Action Plan: Progress to Plan

## INTRODUCTION

California has large, dispersed, and untapped biomass resources that can be used as a source of energy. The gross potential of these resources approaches 80 million dry tons of biomass from our state's farms, forests and landfills. In its *2005 Integrated Energy Policy Report,* the Energy Commission underscored the strategic value of harnessing California's urban, forestry and agriculture waste residues as a source of biopower, biogas, and biofuels.

Biomass is a resource capable of making a significant contribution to state petroleum reduction, renewable energy, waste disposal and climate protection goals. Capturing methane from landfills and converting manure from California's dairies has a net climate change benefit, while using forest and agricultural biomass as a source of transportation fuel or combined heat and power can produce useful energy. Other public benefits of converting the state's urban, forestry and agricultural residues to energy involve improving forest health and animal welfare, avoiding catastrophic wildfires, protecting watersheds, creating local jobs, and enhancing rural economic development.[1]

Recognizing these benefits, the Governor signed Executive Order S-06-06 on April 25, 2006, urging state government to expand the sustainable use of bioenergy to address multiple state policy objectives.[2] The Executive Order established the following biomass production and use targets for California:

- For biofuels, the state shall produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050.

- For biomass for electricity, the state must meet a 20 percent target within the established state goals for renewable generation for 2010 and 2020.

While biomass power comprises nearly 19 percent of the state's established renewable resource requirements for 2010, sustaining this progress beyond 2010 will require a concerted and coordinated effort by state government and the private sector. Biomass power facilities will produce nearly 1,000 megawatts of electrical generating capacity in 2007. Achieving the Governor's target for 2010

[1] Susan J. Brown and Valentino Tiangco, California Energy Commission, *Staff Overview Presentation: California's Bioenergy Action Plan,* public meeting of the Bioenergy Interagency Working Group, Sacramento, California, June 11, 2007.

[2] Governor Arnold Schwarzenegger, Executive Order S-06-06, issued April 25, 2006.

and 2020 requires an additional 575 and 1,975 megawatts of capacity, respectively.[3]

According to the California Public Utilities Commission, the state's investor owned utilities have signed contracts that are expected to provide 19 percent of California's Renewable Portfolio Standard (RPS) eligible energy in 2007. However, after 2010, the percentage of biomass needed to achieve the State RPS drops off significantly, as biomass declines to 15 percent of the RPS eligible energy becoming a smaller portion of the total renewable resource.[4]

In 2006, California consumed over 950 million gallons of 5.7 percent ethanol in gasoline and over 43 million gallons of biodiesel, a small amount when compared to 14.5 billion gallons of gasoline and 4 billion gallons of convention diesel consumed that same year. Most of the ethanol used in the state is corn-based and imported from the United States midwest. Existing ethanol facilities in California produced nearly 68 million gallons in 2006, while proposed plants could produce up to 364 million gallons per year. The majority of the state's biodiesel supply, or 29 million gallons in 2006, is also imported into California, while existing instate production provides 14 million gallons and is growing.[5]

The Governor's targets are intended to stimulate instate production of these fuels, using indigenous waste residues and purpose-grown energy crops. Achieving the Governor's targets for biofuels will also require the development of a "second generation" of advanced biofuels by the state's fuel suppliers.

In July 2006, the Governor publicly released the State of California's *Bioenergy Action Plan*, which outlined a series of action steps for state government to:

- Coordinate research, development, demonstration, and commercialization efforts with federal and state agencies.

- Align existing state regulatory requirements to encourage production and use of California's biomass resources.

- Facilitate California as a market leader in technology innovation and market development.

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[3] Brown and Tiangco, June 11, 2007.

[4] Paul Clannon, Executive Director, California Public Utilities Commission, *California's Bioenergy Action Plan: CPUC Actions*, Sacramento, California, June 11, 2007.

[5] Brown and Tiangco, CEC Staff Presentation to the Bioenergy Working Group, Sacramento, California, June 11, 2007.

- Encourage market entry for new applications of bioenergy, including electricity, biogas, and biofuels.

- Maximize the contributions of bioenergy toward achieving multiple state policy goals of petroleum reduction, climate change, renewable energy, and environmental protection.[6]

## PROGRESS TO PLAN

Balancing the often competing state policy objectives is the challenge being addressed by the nine state agencies comprising the Bioenergy Interagency Working Group. While progress is being made in achieving the state's *Bioenergy Action Plan* commitments, more work is needed to achieve the state's bioenergy objectives. The first-year accomplishments of the Working Group are discussed below:

California Air Resources Board

The California Air Resources Board (CARB) is encouraging biofuel use through amendments to its California reformulated gasoline regulations. On June 14, 2007, the Board adopted amendments which favor the use of 10 percent ethanol blends (E10), using the California Predictive Model. This rule will maximize the flexibility of blending ethanol in reformulated gasoline, while reducing California's petroleum dependence and preserving the emissions benefits of reformulated fuels.

In January 2007, the Governor issued Executive Order S-01-07, establishing a goal to reduce carbon intensity of transportation fuels by 10 percent by 2020. CARB plans to develop the Low Carbon Fuel Standard and adopt the standard by regulation in late 2008. Using $2 million in research funding, CARB is concurrently evaluating the multi-media (air, water and waste) impacts and emissions performance of a range of biofuels, with the intent of establishing fuel specifications for various biodiesel blends (B5, B10, and B20).

CARB is developing E10 certification requirements and may revise E85 specifications during 2008. CARB is also in the process of recommending emissions performance standards for the use of biomass and biofuels in stationary sources, for use by local air districts, to be complete by mid-2008. Using $25 million in one-time funding appropriated by the California Legislature and approved by the Governor, CARB has allocated these monies for a wide

[6] State of California, *Bioenergy Action Plan for California,* July 2006, Sacramento, California, CEC Publication CEC-600-2006-010.

range of alternative fuels projects through a joint effort with the Energy Commission.[7]

Energy Commission

The Energy Commission, in partnership with CARB, is preparing a State Alternative Fuels Plan as directed by Assembly Bill 1007 (Chapter 371, Statutes of 2005). The plan development includes an analysis of the "full fuel cycle" costs and benefits of various transportation fuels. This evaluation produced the analytical foundation and "common technical basis" for the Low Carbon Fuel Standard, which CARB will adopt as an "early action measure" under Assembly Bill 32 (Chapter 488, Statutes of 2006).

During 2007, the California Biomass Collaborative completed *A Preliminary Roadmap for the Development of Biomass in California,* a report for the Energy Commission. This report lays out a broad and comprehensive strategy to guide state and federal research, development and demonstration (RD&D), address regulatory and permitting issues, and recommend appropriate public education programs.

This program has also added new renewable electricity capacity to the state's electricity grid, as part of a larger effort to achieve the State Renewable Portfolio Standard (RPS). The RPS has resulted in power purchase contracts totaling between 285 and 391 megawatts of new capacity since March 2007. The Commission has certified 96 biomass facilities and has pre-certified 21 biomass facilities as RPS eligible.

The Commission has revised its Renewable Energy Program guidelines to allow biogas used for electricity generation to qualify as meeting RPS requirements. Through its Renewable Energy Program, the Commission has provided over $150 million in production incentives to 33 biomass power facilities, resulting in 640 megawatts of renewable energy capacity.

The Energy Commission has adopted a greenhouse gases emission performance standard as required by Senate Bill 1368 (Chapter 598, Statutes of 2006). The proposed standard affects all long-term commitments in baseload electrical generation by local publicly owned electric utilities. This standard sets an emissions rate no higher than the rate of emissions of greenhouse gases for combined-cycle natural gas generation, expressing a preference for low carbon sources of electricity, such as biomass-based power.

Through its Public Interest Energy Research (PIER) Program, the Commission awarded $3 million to advance energy conversion technologies using biomass. Funds were awarded to three projects in 2007:

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[7] Robert Sawyer, PhD, Chair, California Air Resources Board, *California's Bioenergy Action Plan Workshop: Summary of ARB Activities,* Sacramento, California, June 11, 2007.

- Metcalf & Eddy and San Francisco Public Utility Commission: Brown Grease Recovery and Biofuel Production Demonstration

- Renewable Energy Institute International: Demonstration of an Integrated Biofuels and Energy Production System

- Bluefire Ethanol: California's first cellulose to ethanol biorefinery project.

Future funding is available for fuel production from agricultural and forest residue, urban waste, food and beverage waste, waste grease, and purpose-grown energy crops. Approximately $3 million in loan funds are available for the design, purchase and installation of eligible biomass technologies through the Commission's Agricultural Loan Program.

Finally, California is home to about 1.7 million cows, or 18 percent of the United States milking cows, which is a significant source of manure for biogas production. To date, the Commission has installed ten dairy digesters at sites throughout California, generating 2.5 megawatts of electric power from dairy manure or a mixture of manure, food wastes and wastewater.[8] Through PIER, the Commission is funding an economic study on dairy digesters for use by the State Water Resources Control Board.

To achieve the maximum carbon reduction benefits from capturing methane gas as a source of biofuel produced from dairy manure and food wastes requires a state and regional effort. All of these efforts compliment the intent of a Memorandum of Understanding signed on June 15, 2006, by the State of California with the government of Sweden, pledging cooperation on development of renewable energy and fuels, particularly biogas.[9]

California Department of Food and Agriculture

The California Department of Food and Agriculture (CDFA) is working to influence federal funding opportunities in the 2007 Federal Farm Bill, especially provisions that fund conversion of agricultural residues and specialty crops to biomass power, fuels, and other valuable co-products. Agriculture Secretary A. G. Kawamura is working with 22 other states on the 25x25 Initiative, a coalition of states aimed at achieving the goal of 25 percent renewable energy

[8] Brown and Tiangco, CEC Staff Presentation, Sacramento, California, June 11, 2007.

[9] Memorandum of Understanding between the State of California and the Government of the Kingdom of Sweden on Renewable Fuels and Energy, signed in Stockholm on June 15, 2006, by Lena Sommestad, Minister of the Environment for Sweden and Joseph F. Desmond, Undersecretary for Energy Affairs, Resources Agency, and James D. Boyd, Commission, California Energy Commission.

from the nation's farms and forests by 2025. These efforts complement our state's Renewable Portfolio Standard.

CDFA places high priority on strategies that preserve animal health and on new cropping methods that reduce agriculture's environmental footprint. CDFA has evaluated the market potential for growing specialty crops as a source of energy, and for establishing regional manure management centers throughout California to minimize animal disposal and animal disease. Some specialty crops, such as figs, strawberries, and barley are being converted to energy in California.[10]

Of particular interest to CDFA are efforts by California farmers to harness dairy and food wastes as a source of energy. CDFA has collaborated with the State Water Resources Control Board and Regional Water Quality Control Boards and the farm community to strengthen water protection and discharge requirements for dairies, which can produce biogas, while protecting water quality. CDFA has participated in the development of dairy digester reporting protocols by the California Climate Action Registry (Registry), which will be adopted by CARB, and has worked with the California Public Utilities Commission (CPUC) to facilitate on-the-farm power sales and distribution.[11]

California Integrated Waste Management Board

The California Integrated Waste Management Board (CIWMB) has completed its strategic plan which is intended to increase bioenergy production at landfills. This plan quantifies the amount of waste material currently being disposed of in landfills, and assesses the potential for waste conversion to biofuels and other bio-based products. As part of its strategic objectives, the Board has endorsed the following goals for 2010 and beyond for landfill-bound wastes to be used for energy production.[12]

- By 2010, divert 10 percent of the biomass wastes and 20 percent of the organic residuals from landfills.

- By 2020, divert 40 percent of the biomass residuals and 60 percent of the biomass organic residuals from landfills.

While statewide diversion of landfill wastes reached 52 percent in 2005, achieving this goal has only managed to keep pace with increased waste generation over the same period. As a result, over 43 million tons of material is

[10] Gary C. Mattheson, Matteson and Associations, July 2, 2007.

[11] Steve Shaffer, California Department of Food and Agriculture, *CDFA Update on Progress to Plan: Bioenergy Action Plan Public Workshop*, Sacramento, California, June 11, 2007.

[12] California Integrated Waste Management Board's (CIWMB) Strategic Plan: *Potential for Creating Bioenergy and Biofuels from Landfill-Bound Residuals and Landfill Gas,* May 2007.

being disposed in landfills, an amount that is likely to grow as a result of population growth. As part of its statewide diversion strategy, the Board is encouraging the production of landfill gas to biofuels at the state's waste disposal facilities, but the amount of compressed natural gas, liquefied natural gas and hydrogen produced from methane, remains negligible.[13]

Legislation has been introduced again this year that would amend existing law to revise the current definition of "waste transformation" to align with current waste conversion technology. Statutory clarification is a major hurdle to be overcome to enable use of biomass residues through both combustion and non-combustion technologies, such as gasification, fermentation and pyrolysis. Such legislation is pending.

California Public Utilities Commission (CPUC)

Governor's Executive Order S-06-06 directed the CPUC to initiate a new proceeding or build on an existing proceeding to encourage sustainable use of biomass and other renewable resources by the state's investor owned utilities (IOU). In its August 21, 2006, Scoping Memo and Ruling in connection with the Renewable Portfolio Standard (RPS), the CPUC proposed that the unique benefits of biopower be considered among the evaluation criteria to be used in procuring new utility resource additions.

Under this proposal, each bidder is encouraged to address the unique benefits of biomass power relating to the adequacy of electricity resources, State RPS requirements, and California's climate change reduction targets. If adopted in the proceeding, the non-electric public benefits of biomass power (e.g. waste disposal, forest fire risk reduction, cleaner air by avoiding open field burning) would be a factor in future CPUC resource procurement decisions. A decision in that proceeding is pending before the CPUC.

Since 2002, the CPUC has approved 36 PRS contracts for biomass and biogas facilities, including 221 megawatts of new electrical capacity. About 31 megawatts of new biomass capacity is expected to come online within the next 12 months.[14] The CPUC is working with the Energy Commission to streamline the RPS process, and to identify and resolve potential regulatory barriers to biomass power development. Other issues within the CPUC purview that will be examined include:

- Review and streamline interconnection requirements.

[13] Margo Reid Brown, Chair, California Integrated Waste Management Board, *CIWMB Tasks in support of the Bioenergy Action Plan*, Sacramento, California, June 11, 2007.

[14] June 29, 2007 e-mail comments from Judith Ikle, CPUC Energy Division.

- Allow IOUs to offer net metering to biomass power facilities and support legislation to increase net metering caps.

- Assess the costs and benefits of allowing biomass facilities to wheel power directly to farms and to consolidate new metering accounts on a farm. (This would require legislation.)

- Establish appropriate avoided costs and long-term contracts that preserve the operation of existing biomass power facilities.

- Extend eligibility for biomass projects under the Self-Generation Incentive Program (legislation is pending).

On March 15, 2007, the CPUC approved a power purchase agreement for a 150 kilowatt dairy biogas generation with Pacific Gas and Electric Company (PG&E). Furthermore, on May 24, 2007, the CPUC approved a PG&E contract with Bio Energy to buy biogas from California dairies, inject it into the natural gas pipeline, and burn it in a conventional, gas-fired power plant.[15] In March 2007, the Energy Commission certified this type of process as RPS-eligible.

These regulatory incentives may allow utilities to sign similar agreements which help satisfy State RPS requirements. Similarly, biogas from dairy waste may be eligible for renewable energy credits due to the unique environmental and economic benefits of this resource.

The CPUC has proposed a Renewable Power Purchase Tariff for public water and wastewater agencies as required by Assembly Bill 1969 (Chapter 731, Statues of 2006). The proposed decision suggests making an additional 250 megawatts of small-sized biomass pilot projects (e.g. municipal wastewater treatment facilities, dairy digesters) eligible for the proposed tariff.

Finally, the CPUC adopted a greenhouse gas emission performance standard for new long-term power contracts, specifying a maximum rate of 1,100 pounds of carbon dioxide per megawatt-hour. This standard is consistent with the Energy Commission's proposed standard for municipal utilities. Biomass and other renewable energy sources comply with the CPUC and Energy Commission standards.[16]

Department of Forestry and Fire Protection (Cal Fire)

Cal Fire is making consistent and timely progress to meet its commitments as outlined in the *Bioenergy Action Plan*. For the near-term, the department is

[15] Judith Ikle, CPUC Energy Division, June 29, 2007.

[16] Paul Clanon, California Public Utilities Commission, June 11, 2007.

planning a small biomass cogeneration project at the Parlin Fork Conservation Camp and is in the process of identifying the most efficient means of harvesting and collecting the biomass to fuel that facility. The department is collaborating with the Registry on urban forestry climate accounting protocols that encourage "best practices" for both forest management and resource conservation, while maintaining the state's forest lands as carbon sinks.

In conjunction with the Tahoe Conservancy, the department is working to secure state funding for a forest biomass demonstration program in the Tahoe Basin. This program, if funding can be secured, would demonstrate the significant benefits of reducing the risk of catastrophic wildfires and avoiding large fire suppression costs, while thinning the forests. The department is partnering with the Energy Commission on the Western Carbon Sequestration Partnership (West Carb) to evaluate the feasibility of storing carbon in both geologic and terrestrial forms.[17]

The Board of Forestry and Fire Protection, which regulates forestlands and oversees state policy on resource conservation and fire suppression, issued a policy statement in May 2007, linking forest protection and climate change. The intent of this policy is to influence carbon sequestration and storage, while providing incentives to forest land owners. The Board is considering regulatory changes and tax incentives that reduce impediments to forest biomass harvesting.[18]

Tahoe Conservancy

The Tahoe Conservancy, with the support of Cal Fire and the Energy Commission, is seeking federal, state and private funding this year for a basin-wide forest biomass program that will reduce the potential for catastrophic wildfires in the Basin. A biomass program in the Tahoe Basin would provide an alternative method to dispose of excess forest biomass, contribute to state renewable energy goals, reduce smoke and particulates from burning forest residues, and develop a commercial infrastructure to create a value added product (energy) from forest thinning. State funding has not yet been secured.[19]

Placer County released its strategic plan for biomass development based, in large part, on the state's *Bioenergy Action Plan*. Placer County has experienced

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[17] Bill Snyder, California Department of Forestry and Fire Protection, *Bioenergy Action Plan for California: Department of Forestry and Fire Protection Update*, Sacramento, California, June 11, 2007.

[18] George Gentry, Board of Forestry and Fire Protection, *Bioenergy Action Plan Contributions,* Sacramento, California, June 11, 2007.

[19] Steve Holl Consulting, *Biomass Initiative for the Lake Tahoe Basin,* prepared for the Tahoe Regional Planning Agency, February 2007.

four major forest fires since 2001 that have consumed over 30,000 acres of forest. The county is seeking financial and technical support from federal, state and private partners for its wildfire protection and woody biomass program. This program will improve air quality (by avoiding forest fires) and increase renewable energy production. If funding is be secured, the county plans at least one forest biomass-to-energy project in the Tahoe Basin.[20]

Department of General Services

The State Department of General Services (DGS) continues to purchase large numbers of flexible fueled vehicles for the state fleet, purchasing over 1,100 E-85 vehicles during the last two years. The department purchases roughly 7,000 new state vehicles each year of the total 50,000 light and heavy duty vehicles in the state fleet. California Department of Transportation, Cal Fire and the Department of Corrections operate the largest state fleets. DGS plans to purchase more alternative fueled vehicles with the expectation that fueling infrastructure will be established by the state's fuel suppliers. To date, none of these vehicles are being operated from fuels produced from biomass.

The department is assisting other state agencies, such as Cal Fire to identify potential revenue and funding sources for at least three combined heat and power projects. The department is working with the Department of Finance to establish funding criteria to account for the life cycle costs of a given energy project. In this way, the department is working to incorporate renewable energy and energy efficiency features into new state buildings.[21]

State Water Resources Control Board

The State Water Resources Control Board (State Water Board) is committed to identifying clear and consistent procedures that are used to preserve and protect water quality during the harvesting of biomass and the operation of biomass facilities. In particular, the State Water Board is working to resolve permitting uncertainties for dairy digester projects in collaboration with the Regional Water Quality Control Boards. The Central Valley Regional Board has increased staffing for dairy issues from seven to fourteen fulltime positions. This additional staff will allow permitting issues related to dairy digesters and other renewable energy projects to be resolved more promptly than in the past.[22]

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[20] Brett Storey, Placer County Biomass Program Manager, *California's Bioenergy Action Plan: Solutions to Market Barriers and Regulatory Hurdles to Sustainable Use of Biomass from Forestry Resource Stream*, Sacramento, California, June 11, 2007.

[21] William Simms and Roy McBrayer, California Department of Generation Services, *Bioenergy Action Plan Progress*, Sacramento, California, June 11, 2007.

[22] Gary Wolff, Vice Chair, State Water Resources Control Board, and Bob Langeull, SWRCB Office of Research, Planning and Performance, June 8, 2007, memorandum on "Estimation of

The State Water Board estimates that anaerobic digestion of manure at dairies could produce up to 1,530 gigawatt-hours of electricity.[23] As a first step in addressing the costs of fully mitigating air, water and waste disposal impacts, the Board has arranged for an economic study of the effects of air and water quality regulation on proposed dairy digester projects in the Central Valley,

There are approximately 1,600 dairy farms in California within the jurisdiction of the Central Valley Regional Water Quality Control Board (Region 5). Historically, most of these dairies have operated under a waiver of waste discharge requirements; however, in December 2002, changes in state law and federal regulation altered this waiver designation.

On May 4, 2007, the Central Valley Regional Water Quality Control Board adopted new waste discharge regulations for existing milk cow dairies, including new requirements for new and reconstructed dairy lagoons. These regulations are intended to address water quality impacts from sources of salt and nutrients (e.g. nitrates) in dairy lagoons. These requirements do not apply to dairies that accept co-digested wastes (food wastes and manure); dairies that rely on co-digestion are required to obtain individual waste discharge requirements.

This action by the Regional Board clarifies the state requirements for constructing new dairy lagoons or reconstructing an existing lagoon. In addition, the Board has identified the need for funding a multi-media evaluation of the environmental effects of salt loading in the Central Valley. The Regional Board has begun an extensive process to evaluate salt loading and to develop a plan to address growing salt levels in the Central Valley region.[24]

Lastly, the State Board is investigating opportunities to support actions that reduce fire risk, enhance water quality protection, and provide renewable forest biomass fuel from forests.[25]

Private Sector and University Efforts

The private sector and California universities have also contributed to the progress in reaching the state's bioenergy goals. Private industry, utilities, and

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Power Production from RB5 Dairies," presented to the Bioenergy Working Group, Sacramento, California, on June 11, 2007.

[23] E-mail from Gary Wolff, State Water Board, July 10, 2007.

[24] Scott J. Anders, Energy Policy Initiatives Center, University of San Diego School of Law, June 2007 Draft Report entitled *Biogas Production on California's Dairy Farms: A Survey of Regulatory Challenges.* E-mail from John Menke, State Water Board, July 10, 2007.

[25] E-mail from Gary Wolff, State Water Board, July 10, 2007.

venture capitalists have stepped up their efforts in California to finance the commercial development of biofuels projects, most notably, Pacific Ethanol's plant which is operating in Madera, California, and the proposed Blue Fire Ethanol project to be located at a southern California landfill.

Earlier this year Pacific Gas and Electric (PG&E) announced its plan to harness biogas from dairy farms in the Central Valley as a source of pipeline gas for its electricity generation facilities. PG&E, Southern California Gas Company, and the Sacramento Municipal Utility District (SMUD) have increased their efforts to use biogas and biomass power to meet the state's renewable energy commitments. Private companies, such as Real Energy, are creating private/public partnerships for financing dairy biogas production and gas injection facilities.[26]

Southern California Edison (SCE) is offering a standard contract to biomass facilities of up to 20 megawatts, priced at the Market Price Referent that is calculated by the CPUC.[27] SCE is offering three separate forms of contracts that depend on the size of the proposed biomass facility and will make these offers available until December 31, 2007, or until contracts totaling 250 megawatts of biomass power have been signed.[28]

Private fuel supplies and oil companies are investing in the development of "second generation" biofuels include:

- British Petroleum's new global business unit, BP Biofuels, is developing transportation fuels using petroleum and agricultural feedstock. BP is addressing the challenges of cost, availability, quality and sustainability in pursing technology solutions, using lignocellulosics, energy crops, plant modification, and advanced conversion processes.[29]

- Chevron, through its Biofuels Business Unit, is pursuing a two-phased approach, emphasizing ethanol blends in its first generation of biofuels development (GEN 1), primarily with corn-based ethanol production, and evaluating advanced feedstock and processing technology (GEN 2) through partnerships with the University of California at Davis, National

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[26] Kevin Best, Real Energy, *Overcoming Key Market Barriers: Biogas Development and Injection into Natural Gas Pipelines: Moving Renewable Gas into Microgrids, Sacramento, California, June 11, 2007.*

[27] Judith Ikle, CPUC Energy Division, June 29, 2007.

[28] Manual Alvarez, Southern California Edison, June 29, 2007.

[29] Ruth Scotti, U. S. Policy Manager, British Petroleum, *Advanced Biofuels for Transportation,* Sacramento, California, June 11. 2007.

Renewable Energy Lab, Georgia Tech, and Texas A & M University.[30]

- Amyris Biotechnologies was founded in 2003 to address global problems, such as finding affordable anti-malaria drugs for developing countries and leveraging its own proprietary technology to develop hydrocarbon biofuels which perform like conventional gasoline, diesel, and jet fuels. Its technology combines cellulosic technology with both renewable and petroleum-based feedstock.[31]

- Conoco Phillips, an integrated energy company, is producing a diesel fuel substitute, using agricultural, forestry, waste oils, wood, grass and cane. The company sees an opportunity to produce biofuels from animal fats, waste oils, and vegetable oils through a hydrotreating process. The company has partnered with Tyson to produce biofuels from animal fats. Its fuel can be transported through existing petroleum pipelines.[32]

- Neste Oil, an international fuel company with headquarters in Finland, is investing in renewable diesel fuel, derived from vegetable oils or animal fats that can be used in today's engines. Its fuel property compares well with other fuel formulations, such as gas-to-liquid and esters, on viscosity, cetane, cloud point, heating value, and other desirable characteristics. The company is testing its fuel formulation to demonstrate its low carbon value and tailpipe emissions performance.[33]

The California Biomass Collaborative, located at the University of California at Davis (UC Davis), continues to provide technical support to the Bioenergy Working Group. The Collaborative, through its Executive Board composed of representatives from government, industry and academia, performs numerous valuable functions, including resource assessment, facility performance reporting, research management, policy evaluation and coordination, education and training, and public outreach.

Close collaboration with private companies, the federal government, and California's universities has resulted in considerable research funding for development of advanced biomass conversion technologies, commercial development of at least one biomass-to-ethanol project, and the creation of

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[30] Paul Bryan, Vice President – Technology, Chevron Biofuels Business Unit, *Advanced Technology for Renewable Transportation Fuels,* Sacramento, California, June 11, 2007.

[31] Kinkead Reiling, *Amyris Biotechnologies*, Sacramento, California, June 11, 2007.

[32] Daniel Sinks, Conoco Phillips, *Renewable Diesel: Keep Options Open,* Sacramento, California. June 11 2007.

[33] Neville Fernandes, Neste Oil, *NExBTL: A 2nd Generation Renewable Diesel,* Sacramento, California, June 11, 2007.

research centers at UC Davis and UC Berkeley on advanced biofuels. Other public/private research efforts include:

- A $500,000 private grant to Lawrence Berkeley National Laboratory and UC Berkeley to establish the Energy Bioscience Institute

- A $125 million grant to UC Berkeley and UC Davis from the U. S. Department of Energy for a Joint BioEnergy Institute to develop environmentally friendly biofuels

- A $25 million grant from Chevron Corporation to UC Davis for bioenergy research.[34]

These research initiatives have established California as a leader in the field of biofuels research and development, and are likely to attract additional research facilities and expertise to California. The State of California has expressed its intent to partner more closely with the U. S. Department of Energy, the U. S. Department of Agriculture, and the U. S. Environmental Protection Agency (U.S. EPA), to realize the expanded national Renewable Fuels Standard and to collaborate on federal Biomass RD&D.

## Key Issue: Regulatory Uncertainty

Numerous state regulatory agencies have jurisdiction over different aspects of biomass production and use. In some cases, these agencies have overlapping or conflicting regulations and policies, making it difficult for any individual agency to evaluate the overall environmental impacts and public benefits of proposed energy projects.

*Recommendations for a Bioenergy Plan for California*, a consultant report prepared for the Working Group and issued in April 2006, emphasized the need for more effective coordination among state regulatory agencies. The Working Group continues to meet to identify and seek to remove unnecessary regulatory barriers to sustainable biomass development, but these efforts have not yet proved sufficient. A closer examination of state regulations, laws, orders and standards is needed by the relevant state agencies.[35]

Several parties, who testified in the June 11, 2007 public meeting of the Bioenergy Working Group, underscored the need for a clear and predictable permitting path for forest biomass, landfill-to-energy, and dairy digester projects. Options discussed at the meeting include the following:

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[34] James N. Sieber, U. S. Department of Agriculture, e-mail comments, July 10, 2007.
[35] State of California, *Recommendations for a Bioenergy Plan for California*, prepared by Navigant Consulting, Inc., for the Bioenergy Interagency Working Group, April 2006, CEC-600-2006-004F.

- Regulatory performance standards that recognize and value the carbon benefits and other **net** environmental benefits (e.g. greenhouse gas reduction benefits of methane capture from landfills or dairy digester gas, solid waste diversion from landfills, and the forest management and fire suppression benefits from forest biomass removal).[36]

- The uncertainty concerning the future carbon market was raised as an emerging issue.[37] Some parties advocated the need for carbon credits in addition to renewable energy credits which may be allowed under the state's climate change and renewable energy programs.

- Exclusions or exemptions for projects that meet prescribed environmental performance standards. For example, U.S. EPA could revise its regulations to allow avoided emissions of criteria pollutants or greenhouse gases to count toward compliance. Collecting and removing agricultural or forestry biomass residues from our farms and forests is especially important in light of the pending prohibition on open field burning.[38]

- Issuing permits based on a cross-media evaluation of the air, water and waste disposal impacts of projects, especially dairy digester projects to allow tradeoffs among environmental attributes or benefits.[39]

- Establishing regulations based on a "net benefits" approach that would allow tradeoffs between oxides of nitrogen and greenhouse gases, for example.[40] One party urged Cal EPA to issue a policy directive on what constitutes a regulatory standard versus a public health standard in evaluating projects.[41]

- Closing the "alternative daily cover" loophole in the current regulations to allow biomass power producers much greater access to woody wastes being landfilled. Currently, a municipal can claim up to 10 percent for diversion of biomass from a landfill, but receives 100 percent credit for

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[36] Chuck White, Waste Management, Inc., June 11, 2007.

[37] Chuck White, Waste Management, Inc., June 11, 2007.

[38] Brett Storey, Placer County, June 11, 2007.

[39] Presentation by Brett Storey, Placer County, and Karl Longley, Chair, Central Valley Regional Water Board, June 11, 2007.

[40] Ruth McDougal, Sacramento Municipal Utility District (SMUD) and Chuck White, Waste Management, June 11, 2007.

[41] Allen Dusalt, Sustaiable Conservation, June 27, 2007.

using this same material as "alternative daily cover." [42] The absence of diversion credits for landfill-to-energy projects was also cited as a barrier and may require a change in state law.[43]

- Clarifying the outdated definition of "waste transformation" to allow waste handling to be excluded and to allow advanced thermal conversion technologies to be permitted at the state and local levels. Existing statutory definitions are out of date and have not evolved as quickly as biomass conversion technologies.[44]

- Improving access to federal forest lands as a source of forest biomass fuel (which may require a change in federal law to reverse a prohibition on logging or allow removal of small logs and forest thinning). Reducing fuel loading by the U. S. Forest Service is restricted and is currently being accomplished by burning (40 percent of the total) forest residues. Without federal statutory change, proper forest management is being hampered, and the risk and cost of catastrophic wildfires, such as the recent Angora Lake fire in Tahoe, continues to rise.[45]

- Allowing wheeling of onsite power generation from one site to another which is costly under current conditions. Also, the cost of standby power can be prohibitive, especially for smaller projects.[46]

- Consolidating permits under a single lead agency, establishing a permit mediation process and eliminating multiple but uncoordinated reviews by individual permitting agencies.[47] Flexible permitting should allow reasonable projects to move forward while research, data collection and advanced technology development is conducted on a parallel path.[48]

- Establishing a one-stop clearinghouse function at the state level to facilitate permitting in one place and to collect and maintain scientific data

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[42] Michael Theroux, Theroux Environmental, comments filed Docket 06-BAP-1 dated June 10, 2007.

[43] Chuck White, Waste Management, Inc., June 11, 2007.

[44] Jim Stewart, Bio Energy Producers Association, and Ruth McDougal of SMUD, June 11, 2007.

[45] Steve Brink, California Forestry Association, June 11, 2007.

[46] Gary Mattheson, July 2, 2007.

[47] Steve Brink, California Forestry Association, comments filed in Docket 06-BAP-1 dated June 4, 2007, Chuck White, Waste Management, Inc., and Jim Stewart, Bio Energy Producers Association, June 11, 2007.

[48] Ruth McDougal, Sacramento Municipal Utility District (SMUD), June 11, 2007.

on the environmental impacts of proposed projects. One party suggested that state agencies maintain an Internet web page that shows the status of permits, a customer satisfaction survey, and annual performance reporting by state and regional regulatory agencies.[49]

## Key Issue: Valuing of Public Benefits

Biomass energy provides unique benefits that are not adequately valued in the current energy marketplace. Recognizing and quantifying these benefits would reward developers of bioenergy projects for the inherent public benefits of using the state's biomass resource. With the appropriate level of state financial support, the biomass industry could flourish in California, although opinions differ widely on the level and extent of such support.[50]

Representatives of the biomass power industry filed comments before the CPUC in the PRS proceeding R.06-05-027, calling for compensation for the unique benefits of this renewable resource. According to the industry, keeping existing biomass plants in operation and expanding biomass power production has an already high cost of production, when compared to other renewable sources. Producing energy from biomass is more expensive, relative to other renewable sources, largely due to the cost of transporting the biomass residues to the production facility.

If current trends continue, the industry believes that biomass power will fall short of the Governor's goal of achieving 20 percent of the RPS requirements with biomass by 2010. The industry recommended:

- Including the unique benefits of biopower in the list of evaluation criteria used for utility resource procurement and bidding process in the CPUC rulemaking that is currently underway. (This may require legislation, since the RPS program is required to be "resource neutral.")[51]

- Accounting for the relative small size and higher production cost of distributed biomass power facilities (e.g. the production cost of state of the art biomass facilities is in the 8 to 9 cents per kilowatt-hour range for large facilities; the cost of smaller facilities is even higher).

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[49] Allen Dusalt, Sustainable Conservation, June 27, 2007.

[50] Navigant Consulting: *Recommendations for a Bioenergy Plan for California*, April 2006, CEC-600-2006-004F, page 33-35.

[51] Judith Ikle, CPUC Energy Division, June 29, 2007.

- Extending the federal production tax credit currently available for certain biomass facilities (the future of the 1 cent per kilowatt-hour credit is uncertain).

- Developing a system of credits to biomass producers for the waste disposal, forest wildfire risk reduction, clear air (avoiding open field burning), and greenhouse gas reduction benefits through direct subsidies.[52]

- Adopting a fuel-equivalent approach for biogas production facilities that provide electricity to qualifying renewable energy facilities. This approach would provide an incentive for utilities to invest in additional biogas production. It would measure the volume of biogas used in a generator against the total fuel consumed in obtaining credit toward RPS compliance.[53]

- Offering regulatory and financial incentives for distributed biogas projects that serve remote and decentralized electrical loads (microgrids), in order to encourage utility investment in biogas production facilities.[54]

- Establishing sustainability standards for biomass power and biofuels that address the correct choice of feedstock supply, crop shifting issues, land conversion effects, and food versus fuel competition.[55]

Several parties who testified at the June 11, 2007 workshop offered other suggestions on how to value the potential waste disposal, environmental, and greenhouse gas reduction benefits of the state's biomass resources.

- Funding the California Climate Action Registry to incorporate the carbon value of proposed biogas, landfill-to-energy, and biomass power projects into its voluntary reporting protocols.[56] The Registry's protocols for voluntary reporting of greenhouse gas emissions could be an important first step in valuing and measuring the carbon value of proposed projects.

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[52] Joint comments of the Green Power Institute, California Biomass Energy Alliance, and the California Forestry Association: Biomass Issues in the Scoping Memo and Ruling of the Assigned CPUC Commissioner (Rulemaking R-06-05-027), dated October 13, 2006.

[53] William L. Reed, Sempra Energy, coments filed June 28, 2007, on the Bioenergy Action Plan, Docket No. 06-BAP-1.

[54] William L, Reed, June 28, 2007.

[55] Bryan Jenkins, California Biomass Collaborative: informal communication, July 9, 2007.

[56] Hal La Flash, Pacific Gas and Electric Company, Sacramento, California, June 11, 2007.

- Accelerating federal and state RD&D funding to produce biofuels from California's waste biomass and purpose grown crops, addressing economies of scale issues and developing low-emission conversion options.[57]

- Improving the economics of biomass power projects by co-firing with coal and petroleum coke, restarting closed biomass plants, and demonstrating new technologies.[58] The cost of collecting and transporting biomass residues to large-scale electrical generating facilities negatively affects the economics.

- Continuing the current Public Goods Charge (PGC) subsidy or providing other incentives at an adequate level (an additional 2 cents per kilowatt-hour was suggested).[59]

- Establishing a method for evaluating the life cycle costs and benefits of biomass power projects. For forestry projects, a prototype model is being developed by the Energy Commission to value the costs and environmental benefits of in-forest thinning on forest health, fire risk, and watershed protection.[60]

- Obtaining federal tax parity with wind and geothermal energy which would require a change in federal law.[61]

- Allowing the sale of greenhouse gas reduction credits for carbon reduction from biomass plants. (A CPUC decision may be needed before such a proposal could be addressed).

- Enacting a 25 cent per month waste disposal charge on all trash bills to provide incentive funds for landfill to energy or urban biomass projects.[62]

- Adopting the European model for a feed-in tariff, similar to the one Germany has adopted for biogas-produced electricity, providing bonus payments for projects that use animal manure, combined heat and power,

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[57] Hal La Flash, PG&E, June 11, 2007.

[58] Hal La Flash, PG&E, June 11, 2007.

[59] Phil Reese, California Biomass Alliance, Sacramento, California, June 11, 2007.

[60] CEC Contract# 500-03-019, Dr. Mark Nechodom, Principal Investigator, U.S. Department of Agriculture, Forest Service.

[61] Phil Reese, June 11, 2007.

[62] Phil Reese, June 11, 2007.

or advanced biomass conversion technologies.[63]

- Paying attractive prices for biomass-based energy that would be offered consistently will produce positive results. Incentives, such as feed-in tariffs, could be offered as a transition strategy, until the emerging and still uncertain carbon market develops.

- Offering State Business Energy Tax Credits and Industrial Development Bonds, similar to those offered in the State of Oregon.[64]

- Establishing a Self Generation Incentive Program, similar to the one the CPUC has established, for biogas that is injected in a natural gas pipeline.[65]

## Conclusions and Next Steps

Addressing regulatory uncertainty and the pricing of public benefits unique to biomass power and biofuels remain critical issues requiring resolution. This paper highlights these issues and also forms the basis for the "progress to plan" report. Consistent with the Governor's Executive Order S-06-06 on Biomass, the Bioenergy Working Group will consider these recommended options and provide final recommendations in the *2007 Energy Report.*

The Working Group requests additional public comment and stakeholder input on the outstanding issues and options discussed at the June 11, 2007 public meeting of the Bioenergy Working Group and reflected in this paper. Specifically, the Working Group is seeking comments on what additional state actions are needed to meet the state's bioenergy goals. Once the paper is finalized, it will be incorporated in the formal record of the *2007 Energy Report* proceeding.

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[63] Scott Anders, *Biogas Production on California's Diary Farms: A Survey of Regulatory Challenges,* University of San Diego Law School, pages 20-21.

[64] Kevin Best, Real Energy, Sacramento, California, June 11, 2007.

[65] Kevin Best, Real Energy, June 11, 2007