

Status of Cost-Shifting Strategies for the Biomass-to-Energy Industry

*A Report to the Legislature Prepared for Cal/EPA
by the Integrated Waste Management Board*

April 2001

S T A T E O F C A L I F O R N I A

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Executive Summary

California's biomass-to-energy industry, at full capacity, has the potential to supply about 2 percent of California's electrical demand, including energy supply, during periods of peak demand.¹ In 1999, the 29 operating biomass-to-energy facilities used 6.4 million tons of biomass materials—wood-processing, forestry, agricultural, and urban wood residuals. They had a capacity of 600 megawatts (MW), produced 3 million megawatt-hours of electricity, and provided 750 direct jobs and approximately 2,200 indirect jobs for fuel processors and other services.

In addition to energy, biomass-to-energy production provides environmental benefits that include using excess forest undergrowth removed from high risk fire areas and reducing emissions of air pollutants from landfills and open-field burning. The U.S. Department of Energy estimates that these environmental benefits are worth about \$370 million annually to the State.

However, the industry has declined dramatically in the last decade. This is largely due to expiration of contracts containing fixed prices favorable to the industry for the electricity produced from renewable fuels such as biomass (or expiration of specific favorable price provisions in the contracts). Many biomass-to-energy plants either reduced their output or shut down because costs exceeded these lower revenues (at least until energy prices began surging in the summer of 2000). If this existing infrastructure, and the myriad of suppliers associated with it, continues to disappear, resulting conditions will severely impact California's ability to produce energy during peak periods and many local jurisdictions' ability to meet the State mandate of diverting 50 percent of solid waste from landfills.

The total decline between 1980 and 1999 was 28 plants, representing a capacity of 264 MW; 14 of these plants were idled and 14 were dismantled. Recently, three additional plants with capacity of 51 MW were idled, two because of lack of payments from utilities for electricity produced and one because of fuel supply problems. As a result, only 26 plants are currently operating, with 550 MW of capacity. Of the 17 currently idled plants, industry analysts estimate that 10 to 11, with a capacity of 135 to 160 MW, can be restarted by mid-2001 under certain conditions.

Assembly Bill (AB) 2273 (Chapter 816, Statutes of 1998, Woods) requires the California Environmental Protection Agency (Cal/EPA) to submit a report to the Legislature on the existence, status, and progress of public policy cost-shifting strategies for the biomass-to-energy industry. A first report, *Report on Status of Cost-Shifting Strategies for Biomass Industry*, was prepared in March 1999.

In the two years since the first status report, the Governor and Legislature have enacted several provisions that acknowledge the benefits of biomass-to-energy production and provide economic support to the industry, including:

- Agricultural Biomass-to-Energy Incentive Grant Program: AB 2825 (Chapter 739, Statutes of 2000, Battin and Florez) authorized the Trade and Commerce Agency to provide up to \$10 million per year for three years in incentive payments to California biomass-to-energy facilities to use agricultural residues as feedstock. The payments offset the higher costs of using these residues.
- Continued funding for renewable energy programs and projects: Senate Bill (SB) 1194 (Chapter 1050, Statutes of 2000, Sher) and AB 995 (Chapter 1051, Statutes of 2000, Wright) extended the collection of \$135 million per year from electric rate payers to support public goods and renewable energy programs through January 2012. The legislation requires the California Energy Commission (CEC) to create an investment plan with the long-term goal of a fully competitive and self-sustaining California renewable energy supply. It is unclear whether any of these funds will be available to the biomass-to-energy industry.

- Modified biomass conversion definition: AB 514 (Chapter 439, Statutes of 1999, Thomson) revised the definition of biomass conversion in the California Integrated Waste Management Act to include the controlled combustion of nonrecyclable pulp and paper materials. This could result in lower costs for some fuels used at biomass-to-energy facilities.

The federal government also has developed initiatives that could affect the biomass-to-energy industry. For example, the U.S. Department of Agriculture and Department of Interior's National Fire Plan recognizes the need to reduce the risk of fire stemming from excess accumulation of woody fuels in national forests. If implemented, provisions in the Plan could increase the supply of fuel from forests that is available to biomass-to-energy producers.

However, despite these actions, California has yet to develop a comprehensive long-term policy to preserve and grow its biomass-to-energy industry. In light of current power shortages and price increases, the role of the biomass-to-energy industry in contributing to a viable power generation system in California warrants continuing support.

This support is warranted even though spot market* prices for electricity rose dramatically in mid-2000 and biomass-to-energy generator revenues increased significantly. The high on-paper profits earned by generators during late 2000 and early 2001 could call into question the need for future cost-shifting programs. However, biomass-to-energy generators have not actually been paid for most of the electricity they produced under these high rates, and there is no guarantee of payments in the future for this already-delivered electricity. As a result, many facilities are in a weak financial position, despite the very high profits they appear to be earning on paper.

These two issues—lack of payment by utilities for electricity already produced and uncertainty about future energy prices—frame the debate about providing support for existing and idled biomass-to-energy facilities. Industry representatives indicate that biomass-to-energy operators are willing to reopen facilities if they can enter into long-term fixed price contracts with fixed energy rates (at a level considerably lower than current market prices) over a five-year period. However, the industry as a whole is unwilling to enter into these contracts prior to receiving payment of what utilities already owe.

Beyond the issue of payments for electricity already generated, industry representatives suggest these actions:

- Establishing State policy that requires long-term contracts between utilities and biomass-to-energy facilities for the purchase of energy from these facilities.
- Establishing State policy that establishes a minimum-purchase requirement for all renewable energy, which would help guarantee future markets.
- Working with California's Congressional delegation to amend the tax credit provided under Internal Revenue Code Section 45 so that all biomass-to-energy facilities qualify.
- Supporting provision of financial incentives to assist in bringing facilities on line, including, but not limited to, (1) expanding the current State grant program for biomass fuel use and (2) ensuring that eligibility for "production transition payments" provided by the California Energy Commission include idled biomass-to-energy plants that come on line, under the same terms as for currently operating facilities.

* A spot market is for immediate delivery of a commodity, as opposed to future delivery. It is also known as a "cash market" or "physical market."

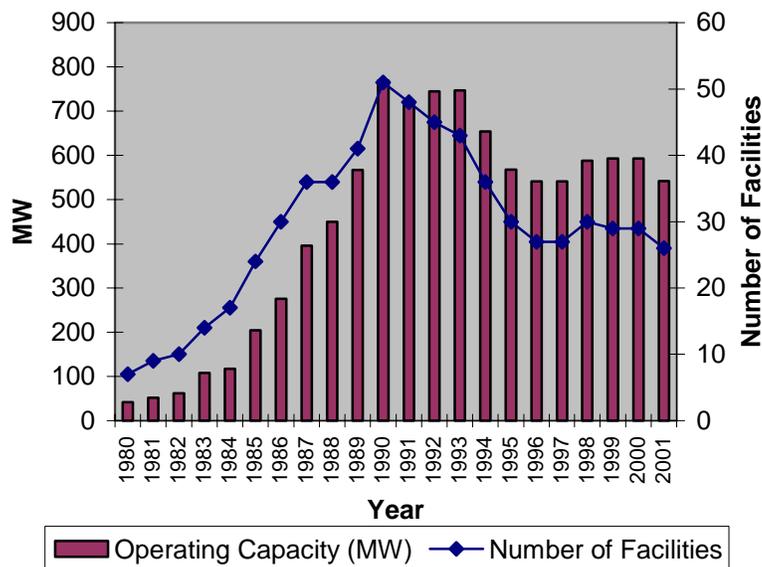
Introduction

Trends In California's Biomass-to-Energy Industry

At full capacity, California's biomass-to-energy industry currently has the potential to supply about two percent of California's electrical demand, including crucial energy supply during peak demand.² In 1999, the 29 operating facilities had a total of 600 MW of capacity, used 6.4 million tons of biomass materials, and produced three million megawatt hours of electricity. Of these 29 plants, 22 were located in Northern California. The 29 plants provided 750 direct jobs and approximately 2,200 indirect jobs for fuel processors and other services.

Since 1980, \$2.5 billion has been invested to plan or construct biomass power facilities in California. Since the early 1990s, however, the number of operating facilities and their level of output have declined dramatically (Figure 1). In 1990, there were 51 operating plants; this number decreased to 27 in 1997, increased to 29 in 1999, and decreased again recently to 26. Peak power capacity occurred in 1990 at 788 MW, declined to 584 MW in 1998, and increased to 601 MW in 1999. In addition, over 130 entities that formerly processed organic materials for various uses, including providing fuel to biomass-to-energy facilities, have closed or become inactive in recent years; many of these were likely casualties of the decline in the biomass-to-energy industry.³

Figure 1. Biomass-to-Energy Facilities and Capacity



Specifically, between 1980 and 1999, 28 plants were idled or dismantled, and five were converted to natural gas facilities. These represented 38 percent of the total constructed capacity in the state.⁴ More recently, three additional plants (two in Lassen County, one in Shasta County) with a capacity of 51 MW were idled, two because of lack of payment from utilities for electricity produced and one because of fuel supply problems. As a result, only 26 plants are currently operating (Table A). Of the 17 currently idled plants, industry analysts estimate that 10 to 11, with capacity of 135 to 160 MW, can be restarted by mid-2001 under certain conditions (see section entitled "The Public Policy Framework As Of Mid-April 2001").

Table A. California Biomass-to-Energy Plants, 2001

Status	Number	Megawatts
Operating	26	550
Idled	17	217
Dismantled	14	97
Converted to Gas	5	111
TOTAL	62	975

The biomass-to-energy industry uses the following four categories of biomass fuels, with the proportion of fuels used in 1999 shown in parentheses.⁵

- Wood processing residues such as bark, sawdust, shavings, end cuts (39 percent).
- In-forest residues such as selective thinning residues, slash, cull material (19 percent).
- Agricultural residues, such as orchard and vine prunings and removals, processing residues (pits, hulls, shells), straws (17 percent).
- Urban wood residues such as landscape residuals, construction and demolition debris, land-clearing residuals, wood pallets (25 percent).

The amount of biomass fuel consumed for electrical power generation decreased by 40 percent from 1990 to 1998. In 1990, 9.85 million tons* of organic materials were consumed as fuel, but only 6.4 million tons were used in 1999.⁶ However, no group—including the biomass power industry, the organic materials recycling industry, and the California Integrated Waste Management Board (CIWMB)—has data clearly indicating where the 3 million tons not now being used is going. Anecdotal information suggests the following explanations:

- Significant amounts of agricultural residues have returned to being open-burned.
- Forest residues are being opened-burned, left in the forest, or occasionally used for alternatives such as kiln fuel.
- More residues from all sources are being landfilled or, in some cases, used as alternative daily cover in landfills, which is less expensive than making fuel.⁷

The mix of materials used by biomass-to-energy facilities has also changed over time. The fuel mix is dependent upon amounts of materials being processed, location, season of the year, and prices paid to fuel processors. As biomass-to-energy plants were closed in the 1990s, fuel demand was reduced and prices paid to fuel processors dropped. In-forest and agricultural residues were the first fuels to exit the system, because they are the most expensive source of material to produce and because open burning is a lower-cost alternative. However, because using these residues as biomass fuel does reduce environmental impacts, the State has provided incentives for the use of agricultural residues at biomass-to-energy facilities (see “State Initiatives” section on page 8); the State has not provided similar incentives for the use of in-forest residues. In contrast, wood-process residues generated at sawmills are the least expensive and have remained economically available even during periods of low fuel prices, although they are not available in sufficient amounts to maximize electricity output at individual biomass-to-energy facilities.

* Unless otherwise indicated, tonnages in this report are in “wet” (or “green”) tons. A wet ton is a ton of biomass “as delivered” (containing moisture) to a biomass power facility.

Reasons for the Decline

In the 1980s, as a direct result of federal and State energy policies to diversify and increase the reliability of our energy supply, the independent energy production industry grew rapidly. One policy to encourage this growth came from the California Public Utilities Commission (CPUC), which authorized what are known as Interim Standard Offer #4 Contracts (SO#4 Contracts). Many biomass-to-energy power plants executed SO#4 Contracts; these typically were 30-year contracts, with fixed prices established for the first 10 years of the contracts. As a result, the early 1990s were peak years for California's biomass-to-energy industry. Electric utilities were paying an average of 10 cents per kilowatt-hour (kWh) under the SO#4 contracts and biomass-to-energy facilities were purchasing fuel from processors at prices of up to \$40 per (bone-dry*) ton. While oil and gas prices dropped rapidly in the mid-1990s, electric rates did not. Today, only two biomass-to-energy SO#4 Contracts with the fixed-price period remain, and in both cases the fixed-price period will be over in February 2002.

However, the 11th year, which began occurring in the last few years for some facilities and which will occur soon for the remaining two facilities, has a "price cliff" resulting in a 70 to 80 percent reduction in revenue. With this dramatic lowering of electric rates (at least until June 2000), biomass power plants either reduced their output, shut down because costs exceeded revenues, or in some cases used alternative lower-cost fuel.

All of this was being played out as deregulation of the electric utility industry was being considered. In 1994, the CPUC instituted rulemaking procedures to restructure the electric utility industry to an open-market system, in part with the idea of passing savings on to electric consumers. To prevent losing California's renewable energy industry (including biomass-to-energy) because of the lower electric rates that were expected to result, the CPUC's 1995 restructuring decision also called for a minimum purchase requirement (known as the "renewables portfolio standard") for renewable energy generation. In 1996, the restructuring proposal was superceded by AB 1890 (Chapter 854, Statutes of 1996, Brulte) and SB 90 (Chapter 905, Statutes of 1997, Sher), which established a funding pool from 1998 to 2001 of up to \$540 million for renewable energy facilities (see "State Initiatives" section on page 8. This funding, continuation of which was authorized by SB 1194 (Chapter 1050, Statutes of 2000, Sher) and AB 995 (Chapter 1051, Statutes of 2000, Wright), is seen by the industry as a safety net that can provide assistance to biomass-to-energy generators when market conditions yield less revenue than it costs to generate power.

Relative Costs of Biomass-to-Energy Production

Electricity generated from biomass is more costly to produce than fossil fuel and hydroelectric power for two reasons. First, biomass fuels are expensive. The cost of producing biomass fuel is dependent on the type of biomass, the amount of processing necessary to convert it to a fuel, distance to the energy plant, and supply and demand for fuels in the market place. Biomass fuel is low-density and non-homogeneous and has a small unit size (e.g., individual wood chips are small). Consequently, fuel is costly to collect, process, and transport to facilities.

Second, biomass-to-energy facilities are much smaller than conventional fossil fuel power plants and therefore cannot produce electricity as cost-effectively as the fossil plants. The biomass-to-energy facilities are smaller because of the limited amount of fuel that can be stored at a single facility—the fuel is bulky (e.g., a pile of wood chips is both fibrous and includes "air space"), and limited quantities of fuel can be gathered from any given area. With higher fuel costs and lower economic efficiencies, solid-fuel energy is not economically competitive in a deregulated energy market that gives zero value or compensation for the non-electric benefits generated by the biomass-to-energy industry.

* "Bone-dry" refers to material that has had all moisture removed.

The deregulated energy market does not take into account (or compensate for) the value of environmental benefits provided by biomass-to-energy facilities. These benefits are discussed in the next section of this report.

In 1999, the U.S. Department of Energy’s National Renewable Energy Laboratory (NREL) estimated that production costs for existing biomass-to-energy facilities in California were 6.2 to 7.4 ¢/kWh of electricity sold (Table B).⁸ In contrast, revenues in 1999 averaged 5.0 ¢/kWh. (Under current conditions, industry representatives estimate that the range of production costs is around 5.5 to 9.0 ¢/kWh.⁹)

The difference between revenue and cost, referred to as "cost-shift," thus varied in 1999 from about 1.2 to 2.4 ¢/kWh, depending on fuel type. Cost-shift represents the revenue shortfall, based on conditions at the time, which biomass-to-energy facilities generally need to overcome to remain viable. Public policy measures to address the revenue gap are predicated on the concept that biomass-to-energy provides net positive environmental benefits to California residents.

Table B. Biomass Energy Production in 1999

Biomass Fuel Source	Average Revenue *	Average Cost	Net Difference
	(cents per kilowatt-hour)		
Wood Processing Residues	5.0	6.6	(1.6)
In-Forest Thinning Residues	5.0	7.4	(2.4)
Agricultural Residues	5.0	6.5	(1.5)
Urban Wood Residues	5.0	6.2	(1.2)

Relative Costs and Revenues Before the Energy Crisis (Pre-June 2000)¹⁰

One analysis estimates that in early 2000, before the onset of the energy crisis, the total cost of generating electricity at biomass-to-energy facilities in California was in the range of 6.0 to 6.5 ¢/kWh. How revenues compare with this estimated cost range is important to understand, and complicated. (Some industry representatives believe this estimate is low and may not represent the variability in production costs that currently exists within the industry; if so, this situation would further exacerbate the one described in this and the next section.¹¹)

During most of the 1990s, most biomass-to-energy "qualifying facilities" (QF) in California sold their electricity under long-term (i.e., 30-year) power purchase contracts, known as "Standard Offer #4" or "SO#4" contracts, with Pacific Gas & Electric and Southern California Edison. As part of the contracts, facilities received fixed payments for their "capacity;" these payments averaged 2.0 ¢/kWh. For the first 10 years of the contracts, the facilities also received fixed payments for the energy they produced.

* California energy prices increased above 5 ¢/kWh during the 2000 summer/winter season—see section entitled "Relative Revenues and Costs During the Energy Crisis (June 2000 to Date)" on page 5.

When many long-term SO#4 contracts ended in the late 1990s, producers then were paid much lower wholesale market rates that were based on the Short-Run Avoided Cost (SRAC) rate formula developed by the California Public Utilities Commission. With fixed capacity payments remaining at 2.0 ¢/kW during 1999 and early 2000, the facilities thus needed “energy” revenues of at least 4.0 to 4.5 ¢/kWh in order to be viable, given the estimated production costs of 6.0 to 6.5 ¢/kWh (and even higher revenues would be needed if actual production costs were higher). During the 1990s, SRAC prices were stable, in the range of 2.0–3.0 ¢/kWh; in early 2000, they increased slightly to an average of about 3.5 ¢/kWh.

To compensate for revenue losses stemming from the lower wholesale rates, AB 1890 also provided that biomass-to-energy facilities could receive “transition” payments from the California Energy Commission’s renewables transition fund (RTF) program of up to 1.5 ¢/kWh in 1999 and 1.0 ¢/kWh in early 2000. In 1999, when the total energy price was 4.5 to 5.0 ¢/kWh (i.e., SRAC price of 3.5 ¢/kWh plus RTF payment of 1.0 to 1.5 ¢/kWh), biomass producers responded by increasing their output of energy.

The RTF program was designed to provide this declining transition support payment over a period of four years, with the idea that permanent cost-shifting measures would be developed and phased in concurrently. The RTF program also included a declining ceiling price for SRAC rates, above which support payments would no longer be made. These ceilings were included in the (at the time, seemingly unlikely) event that market energy prices rose to levels at which support payments would no longer be needed. The ceiling price started at 5.0 ¢/kWh in 1998, decreased to 4.5 ¢/kWh in 1999, and decreased to 4.0 ¢/kWh for 2000 and 2001. When the ceiling decreased to 4.0 ¢/kWh in 2000, the economics of biomass energy production became marginal, and many facilities responded by reducing output levels during off-peak hours in early 2000.

Relative Revenues and Costs During the Energy Crisis (June 2000 to Date)¹²

As mentioned above, SO#4 contracts paid favorable prices to independent energy producers in California through most of the 1990’s. AB 1890 established a new pricing entity, the California Power Exchange (PX), which began operations in 1998. The PX created the PX price, a spot market where producers and purchasers established the market price for electricity in California.

Initially, PX and SRAC prices stabilized at about the same range. However, because the PX price was a spot market price for all electricity sales by power producers to the utility companies, this situation had the compounding effect of allowing spot market energy shortages to cause severe spikes in overall electricity prices during summer 2000. On May 23, 2000, PX rates spiked to a level of 47 ¢/kWh, more than six times higher than the previous all-time record. They went even higher after that.

Not surprisingly, when prices rose dramatically, biomass-to-energy revenues also increased dramatically. SRAC rates in the third quarter of 2000 averaged 4.75 ¢/kWh, which made biomass power production profitable again (even though the facilities were no longer eligible for RTF support payments due to the ceiling on SRAC rates). Facilities responded by increasing their production. Total revenues for biomass power sales during the third quarter of 2000 for facilities receiving SRAC rates and capacity payments were in the neighborhood of 8.0 ¢/kWh, rising even higher—at least on paper—in the fourth quarter and into January 2001. Since prices at the PX were even higher, many facilities exercised a one-time option under AB 1890 to change from SRAC to PX pricing during this period, enhancing their operating economics considerably.

The operating margin for biomass power production improved, even after accounting for the effect of increased fuel demand on production costs. Most biomass facilities had already planned to purchase more fuel in order to generate at high capacity during the third quarter of 2000, minimizing the immediate impact of the energy crisis on biomass fuel demand and prices. As a result, the total cost of biomass-to-energy electricity production during the third quarter of 2000 remained around 6.5 ¢/kWh. However, as revenues shot up in the fourth quarter, this created

unexpectedly strong demand for biomass fuels, which pushed spot market fuel prices up dramatically. During December, spot market biomass fuel prices spiked to as high as \$100 per bone-dry ton, and the total cost of biomass electricity production during the fourth quarter rose to 7.5 to 8.5 ¢/kWh. Each \$10 per ton paid for fuel adds about 1 ¢/kWh to the overall cost of producing electricity at biomass-to-energy facilities.¹³

After accounting for these costs, facilities that remained on SRAC pricing had an average net operating margin on paper of approximately 0.5 ¢/kWh during the third quarter and approximately 3.0 ¢/kWh during the fourth quarter. Facilities that switched to PX pricing showed an average net operating margin on paper of approximately 6.5 ¢/kWh during the third quarter and approximately 15.3 ¢/kWh during the fourth quarter.

However, these numbers should not be interpreted as the return to prosperity for the biomass-to-energy industry, because the utilities suspended payments to the biomass power producers in early December. For the portion of the fourth quarter of 2000 for which producers were paid (October 1 to December 5), actual average operating margins were 1.1 ¢/kWh for SRAC pricing and 9.0 ¢/kWh for PX pricing. The future status of revenues for energy deliveries after December 5, which on paper appear to be very high, is completely unknown. At the same time, the run-up in biomass fuel prices ended when the utility companies suspended payments at the end of October 2000.

Valuing the Environmental Benefits of Biomass-to-Energy Production

Although net revenues were generally negative prior to mid-2000, biomass-to-energy facilities provide numerous benefits that are not accounted for in the preceding cost/revenue analysis (see section entitled “Relative Costs of Biomass-to-Energy Production” on page 3).

Biomass-to-energy production displaces energy production from conventional fossil fuel sources and uses materials that in general would otherwise be open burned, landfilled, or left to accumulate in the forest. Increases in landfill disposal would compromise the CIWMB’s mandate to assist local jurisdictions in diverting 50 percent of their solid waste from landfills, and could also increase leachate and emissions of volatile organic compounds and greenhouse gases from landfills. Increased open burning could result in large increases in U.S. Environmental Protection Agency criteria air pollutants and smoke discharges. Increased accumulation of materials in forests could increase the risk of catastrophic wildfire.

NREL estimated the net environmental benefits that California receives annually from the use of biomass fuels by the biomass-to-energy industry.¹⁴ To do so, it estimated the environmental impacts (e.g., air emissions) of biomass-to-energy facilities; impacts if the biomass fuels currently used at these facilities were managed or disposed in other ways (i.e., assuming a total collapse of the California biomass-to-energy industry); and impacts from the fossil fuel production that would be needed to replace the lost biomass-to-energy production. Under this scenario, NREL estimated the portions of biomass materials that would be landfilled, burned in fields, used as kiln boiler fuel, left to accumulate in forests, or be converted to compost and mulch. NREL then assigned economic values (costs) to the emission impacts of biomass-to-energy production, alternative management/disposal methods, and fossil fuel energy production (Table C).

In general, the NREL model found that air pollution—sulfur oxide, nitrogen oxide, particulate matter, carbon monoxide, volatile organic chemical, and greenhouse gas emissions—from open burning, landfilling, and forest accumulation is the principal environmental impact of not using biomass fuels to produce energy. In contrast, NREL estimated that all these emissions are greatly reduced when the biomass is used for biomass-to-energy production.

NREL estimated the annual net economic value of California’s biomass-to-energy industry by adding the costs of alternative management/disposal methods (\$563 million) to the cost of fossil fuel energy production (\$74 million), and subtracting the cost of biomass-to-energy production (\$268 million) (Table C). The net environmental result of biomass-to-energy production—that is,

the public benefits of cleaner air, reduced loading of landfills, reduced emissions of greenhouse gases, and healthier and more productive forests and watersheds—was estimated to be a benefit of \$369 million per year. Social benefits, such as rural employment, economic development, and energy diversity and security, were not included.

Table C. Estimated Costs and Benefits of Biomass-to-Energy Production in California

Alternative Management/Disposal Method	Cost/Year(in millions of dollars)
Open Burning —1.7 million tons per year open-burned (730,000 tons forest residue; 950,000 tons agriculture residue)	\$ 173.5
Forest Accumulation —490,000 tons per year of residue left in forest	\$ 62.7
Burial in Landfill —3.0 million tons per year landfilled (1.5 million tons from wood-processing; 106,000 tons agriculture residue; 1.4 million tons municipal waste wood)	\$ 251.4
Compost and Mulch —370,000 tons to produce compost and mulch (126,000 tons wood-processing waste; 241,000 tons municipal wood)	\$ 19.7
Kiln Boiler —886,000 tons per year of sawmill residue used for energy production in sawmill kiln burners	55.8
Total Disposal/Management Cost If Not Used For Biomass-to-Energy	563.1
Cost of Fossil Fuel Energy Production	74.3
Cost of Biomass-to-Energy Production	(268.4)
Net Benefit of Using 6.4 Million Tons for Biomass-to-Energy = \$ 563.1 + \$ 74.3 - \$ 268.4 = \$ 369.0	369.0

Cost-Shift and Related Provisions

California thus receives valuable environmental benefits from the biomass-to-energy industry, services that are estimated (see preceding section) to be worth even more than the energy produced from biomass. As California moves to a more competitive market for electricity, the ability of the biomass-to-energy industry to continue operating profitably without receiving consideration for these environmental services is questionable. As discussed in Table B, NREL estimated that in the absence of public support, biomass-to-energy plants were losing about 1.2 to 2.4 ¢/kWh under conditions prevalent in 1999. This, of course, was before the recent dramatic increases in energy prices. Even so, if current and near-term energy prices decline in the next few years, biomass-to-energy facilities may be in much the same position in which they have been throughout the late 1990s.

State, federal, and local initiatives that have been implemented or considered since March 1999 to provide incentives to the biomass-to-energy industry are described below.

State Initiatives

Incentives for Renewable Energy Production

In 1996, AB 1890 established a funding pool administered by the California Energy Commission (CEC) of up to \$540 million for renewable energy from 1998 to 2001. The CEC submitted a report to the Legislature in March 1997 with recommendations on how the funding should be allocated. The Legislature incorporated the allocation recommendations into SB 90 (Chapter 905, Statutes of 1997, Sher) and directed the CEC to administer this renewables transition fund (RTF) program. The funds are distributed on the basis of production incentive payments that decline over the four-year time period, and have a ceiling of \$0.015 per kilowatt-hour for 1998 and 1999, dropping to \$0.01 per kilowatt-hour for 2000 and 2001. Existing biomass-to-energy facilities that met certain conditions received \$82 million during the first two years of the program; these subsidies are likely to have contributed to the start up of two operations. However, biomass-to-energy facilities have not used this incentive since early 2000. Unused funds from this four-year period were anticipated to roll over for use as needed at existing renewable energy facilities in future years.¹⁵

SB 1194 (Chapter 1050, Statutes of 2000, Sher) and AB 995 (Chapter 1051, Statutes of 2000, Wright), identical pieces of legislation, continued the recognition that renewable energy provides California with environmental benefits and requires assistance to survive the deregulated energy market. The legislation established a funding pool of \$135 million per year through January 2012, with funds to come from ratepayers of Southern California Edison, San Diego Gas and Electric Company, and Pacific Gas and Electric Company for investing in renewable energy resources. The legislation requires the CEC to create an investment plan with the long-term goal of establishing a competitive and self-sustaining California renewable energy supply. As a direct incentive to the biomass-to-energy industry, it also allows the CEC to devise a mechanism to provide funding to biomass-to-energy facilities to reduce fuel costs. Fuel costs thus would be shifted to the California general electric ratepayer, in return for the public benefits previously described (see "Valuing The Environmental Benefits of Biomass-to-Energy Production" on page 6). This funding is viewed by the industry as a safety net that can provide assistance to biomass-to-energy generators when market conditions yield less revenue than it costs to generate power.

The first draft (December 2000) of the CEC investment plan, which is likely to be amended in light of current circumstances, proposed to allocate an average of \$9 million per year to existing solid-fuel biomass-to-energy facilities for the years 2002 through 2006. This would include the provision of production-based incentives of 1 ¢/kWh for the period 2002 through 2006, so long as the market price does not exceed 5 ¢/kWh. Because of this latter condition, it is unclear whether any of the funds would be accessible to the biomass-to-energy industry. What will occur after 2006 is uncertain.

As part of the overall program, the CEC administers the Public Interest Energy Research (PIER) program (www.energy.ca.gov/pier/), which provides funding to public and private entities for research, development, and demonstration activities that advance science and technology not adequately provided for by competitive or deregulated markets. Funding, initially under AB 1890 and subsequently under SB 1194 and AB 995, is available for environmentally preferred advanced generation, renewables, end-use efficiency, environmental research, and strategic research. PIER planned three programmatic solicitations for release in fiscal year (FY) 2000/2001. The first solicitation addressed efforts to make renewable energy production more affordable; the two other solicitations will address renewable reliability, "dispatchability," and the ability of renewable energy to capture environmental benefits.

The PIER program has funded several other projects intended to help California's biomass-to-energy industry become more cost-competitive:

- In November 1999, the CEC released \$1.3 million in funding for small-scale modular biomass power projects. The funding was targeted to biomass-fueled distributed energy systems to address environmental problems associated with open burning of agricultural residuals, wildfires from forest overgrowth, and urban wood waste in landfills.
- In the second quarter of 2000, CEC released another \$1.63 million to fund two small modular biomass projects.
- The CEC also has a \$340,000 co-funding agreement with the Electric Power Research Institute (EPRI) to assess the renewable energy technology markets in California. The research will address the current market needs and future market trends of renewable energy and quantify benefits from renewable energy generation.

Agricultural Biomass-to-Energy Incentive Grant Program

The State enacted an Agricultural Biomass-to-Energy Incentive Grant Program, established by AB 2872 (Chapter 144, Statutes of 2000, Shelley). The program's intent was to offset higher costs of agricultural biomass delivered by growers to biomass-to-energy facilities. The legislation authorized \$30 million to California's Trade and Commerce Agency over a three-year period to establish an incentive payment grant program, with payments of \$10 per ton for qualified agricultural biomass converted to electricity. The bill defined qualified agricultural biomass as agricultural residues originating in the Sacramento/San Joaquin Valley air basins.

These provisions of AB 2872 were superceded by AB 2825 (Chapter 739, Statutes of 2000, Battin and Florez). This legislation authorized the Trade and Commerce Agency to provide incentive payments (totaling \$10 million per year, for three years) through local air quality management districts to all California biomass-to-energy facilities willing to use agricultural residue as feedstock. AB 2825 further defined facilities to include those that do not produce electricity for sale to a public utility and revised the definition of biomass to include agricultural biomass that the Air Resources Board determines has been historically open-field burned in the geographic jurisdiction of the air district from which the residues are derived. If a facility receives incentive payments, it is ineligible to receive any other production subsidy, rebate, buy-down, or incentive funded through electricity surcharges (e.g., AB 995 funding). The legislation shifts biomass fuel costs to the state taxpayer.

In FY 2000/2001, the Trade and Commerce Agency awarded grants through the air quality management districts to 11 biomass-to-energy facilities. Grant payments are expected to begin in May 2001.

Rice Straw Grant Program

AB 2514 created the Agricultural Biomass Utilization Account in the Department of Food and Agriculture, to be administered by the Department of Food and Agriculture in consultation with the California Air Resources Board and the CIWMB). The legislation allocated \$10 million (reduced to \$2 million dollars in the budget process) from the General Fund to provide grants to persons that use rice straw to create new markets for recycled rice straw products. The Department of Food and Agriculture is to make awards based on quantity of biomass utilized, impact on other environmental or public policy benefits (e.g., landfill avoidance, pollution prevention, electrical generation, sustainability), and impact on moving the rice straw to a nonsubsidized, commodity market. These grants could provide biomass-to-energy producers with additional revenue to offset fuel costs. However, while a limited number of biomass-to-energy producers may use rice straw and be eligible for funding under this program, significant technological constraints to large-scale use of rice straw remain (i.e., the silica in rice straw abrades energy production equipment and increases maintenance costs). The state taxpayer funds this revenue stream.

In 1997, SB 318 (Chapter 745, Statutes of 1997, Thomson) created the Rice Straw Demonstration Project Fund (the Rice Fund) and directed the California Air Resources Board to administer it. The fund provided incentives to develop commercial uses for rice straw and provided grants of up to 50 percent for projects utilizing significant amounts of rice straw in the Sacramento Valley. A total of about \$4.3 million was awarded from the Rice Fund for demonstration and commercialization projects. Biomass-to-energy facilities and entities collecting and processing rice straw for biomass-to-energy were eligible to participate in the grant program.

SB 1794 (Chapter 1019, Statutes of 2000, Ortiz) extended the Rice Straw Demonstration Project Fund for three more years and also required grantees to demonstrate cost-effectiveness and mitigation of environmental impacts. The program will not become operative until moneys are deposited in the fund by the Legislature or other entities. To date, moneys have not been allocated, but an allocation of one million dollars has been proposed in the Governor's budget for FY 2001/2002.

Modified Biomass Conversion Definition

AB 514 (Chapter 439, Statutes of 1999, Thomson) modified the definition of biomass conversion in the California Integrated Waste Management Act of 1989. The original definition referred to the controlled combustion of specified materials that are separated from other solid waste and used for producing electricity or heat, but it excluded the use of pulp or paper materials. This legislation revised the definition to include nonrecyclable pulp or nonrecyclable paper materials. This revised definition could positively impact the biomass-to-energy industry by making nonrecyclable pulp and paper materials available for fuel and possibly provide lower cost fuel. It also could assist jurisdictions in meeting the diversion mandates of the Integrated Waste Management Act by allowing the combustion of these materials to be included as diversion in those jurisdictions where biomass-to-energy facilities are currently located.

Federal Initiatives

Several federal initiatives have been enacted and/or considered that may or will have an impact on California's solid-fuel biomass-to-energy industry. These include Executive Order 13134 (*Developing and Promoting Biobased Products and Bioenergy*) (www.gsa.gov/pbs/pt/call-in/eo13134.htm), the Biomass Research and Development Act of 2000 (www.bioproducts-bioenergy.gov/bio_act.html), the National Fire Plan (www.na.fs.fed.us/nfp/), and Congressional proposals regarding the federal income tax code.

Executive Order 13134 on Biobased Products and Bioenergy

On August 12, 1999, President Clinton issued Executive Order 13134, entitled *Developing and Promoting Biobased Products and Bioenergy*. The Order called for the Administration to develop a comprehensive national strategy, including research and development and private sector incentives, to stimulate the creation and adoption of technologies to make bio-based products and bioenergy cost-competitive in large national and international markets. It established an Interagency Council, as well as an Advisory Committee of stakeholders from the farm, forestry, chemical manufacturing, energy, and electric utilities sectors; environmental and conservation organizations; and the university research community.

The Advisory Committee developed an overview plan that prioritized key technology, market, and policy decisions for the development and implementation of biobased products and bioenergy. In October 2000, the Secretaries of Energy and Agriculture delivered a report to the President that outlined and assessed options for modifying existing programs within their respective agencies to promote biobased products and bioenergy.

Both the Interagency Council and the Advisory Committee were superceded by a new Biomass Research and Development Board and a Technical Advisory Committee, respectively, established by the Biomass Research and Development Act of 2000 (see next section).

The Biomass Research and Development Act of 2000

On June 20, 2000, the President signed the Agricultural Risk Protection Act of 2000 (Public Law 106-224). Title III of this act, the Biomass Research and Development Act of 2000, has provisions that complement or supercede Executive Order 13134. The major thrust is to improve interagency coordination and focus federal research and development (R&D) efforts on the conversion of biomass into biobased industrial products (e.g., ethanol, polylactates, and electricity). The Biomass Research and Development Act authorizes \$49 million in R&D funding at the U.S. Department of Agriculture for specific areas in bioproducts development, and establishes a Biomass R&D Technical Advisory Committee and a Biomass R&D Interagency Board to coordinate and oversee activities related to the initiative.

The National Fire Plan

As a result of the 2000 fire season, President Clinton requested that the Secretaries of the Departments of Interior and Agriculture prepare a report recommending how to respond to that year's severe fires and how to address growing concerns about fire risks in the "wildland-urban interface," areas in the West where new structures and other human developments meet with undeveloped wildland. The resultant National Fire Plan proposes a FY 2001* appropriation increase of \$1.6 billion, to a total of \$2.8 billion, for wildland fire programs in the Departments of Agriculture and the Interior. The biomass-to-energy industry in California could be impacted by two components of the fire plan—reducing hazardous fuel accumulations and local community coordination and outreach. If implemented, these elements could increase the amount of forest residual (brush and small trees) available to the biomass-to-energy industry throughout the state.

The National Fire Plan calls for the U.S. Forest Service to develop strategies to remove excessive fuel through mechanical treatments and prescribed fire to protect communities in high-risk areas, especially in the wildland-urban interface. The Forest Service has proposed allocating \$23 million in FY 2001 to reduce fuel loading on 64,000 acres in the high-risk wildland-urban interface in California. The number of proposed acres to be treated by mechanical thinning (generating biomass) versus prescribed fire is not known at this time. The Department of the Interior's Bureau of Land Management has also proposed allocating \$2.1 million in FY 2001 to hazardous fuels reduction in the high-risk wildland-urban interface in California. Both the Forest Service's and the Bureau of Land Management's fuel reduction programs would increase biomass fuel stocks and reduce fuel costs. Fuel cost reductions would be borne by the federal taxpayer.

The National Fire Plan also recognizes that much of the wildland-urban interface is located on state and private land and that funding to improve fire-readiness at the state and local levels is crucial. Another component of the plan focuses on reducing fuels in forests and rangelands adjacent to and within communities on State, private, or other nonfederal land. Proposed funding would be available in the form of incentives and technical assistance to communities and private landowners to encourage the reduction of hazardous fuels around homeowner properties. For FY 2001, the U.S. Forest Service proposed an allocation of \$3 million to California to fund this component. Funding for this program could increase forest residue available for use as fuel by biomass-to-energy plants and reduce their fuel costs. Fuel cost reductions would be borne by the federal taxpayer.

* Federal government agencies generally refer to fiscal years with one year (e.g., FY 2001 instead of FY 2001/2002).

Internal Revenue Code Section 45

Section 45 of the Internal Revenue Code provides a 1.5 ¢/kWh tax credit to specialized renewable energy facilities for electricity produced using presently qualified sources. The specialized facilities are "closed-loop" biomass-to-energy facilities (which means plant matter must be grown for the sole purpose of being used to generate electricity) and wind-turbines.

In theory, this section of the Internal Revenue Code can provide biomass power producers with additional revenue that can be used to offset fuel costs. However, use of the Section 45 credit is limited to "closed-loop" biomass-to-energy facilities. Due to the cost of developing a closed-loop facility to generate electricity, none have been developed in the United States. Consequently, this tax credit has not been used by California biomass-to-energy facilities.

The tax credit was scheduled to sunset on June 30, 1999, but last year it was extended for wind facilities and closed-loop facilities to December 31, 2001, as part of the Ticket to Work and Work Incentives Improvement Act of 1999 (Public Law 106-170). This legislation also allows facilities that started up after the previous June 30, 1999, expiration date to use the credit. The federal taxpayer funds this revenue stream. However, because of the closed-loop provision, this legislation does not benefit California biomass-to-energy facilities.

Three current bills in Congress propose to amend the language of Section 45 to establish eligibility for existing biomass-to-energy facilities. Senators Boxer (California) and Collins (Maine) recently introduced S.188, which would remove the term "closed-loop biomass" and expand the definition of biomass to include urban wood wastes, agricultural prunings, and specified thinning and mill residues. Biomass facilities placed into service before July 1, 2001, would be eligible for a 1.5 cents ¢/kWh credit for electricity sold into the grid each year for a 10-year period.

Additionally, in February 2001 the Senate Republican leadership introduced comprehensive energy legislation that includes a production tax credit for existing biomass-to-energy facilities (S.389, Senator Murkowski, Alaska). A similar bill was introduced in March 2001 by a coalition of Democratic Senators (S.597, Senator Bingaman, New Mexico).

Related Activities

State of California Biomass Interagency Workgroup

Several State agencies have met informally over the past two years to coordinate statewide activities and initiatives related to biomass issues. The entities in this informal workgroup include Cal/EPA, the California Energy Commission, the Air Resources Board, CIWMB, the Department of Forestry and Fire Protection, the Department of Food and Agriculture, the Resources Agency, and the Trade and Commerce Agency.

Quincy Library Group

The Quincy Library Group Forest Service Act (Public Law 105-277), passed in 1997, mandated that the U.S. Forest Service adopt the Quincy Library Group's five-year forest management plan for the Lassen, Plumas, and Tahoe National Forests. The U.S. Forest Service has made some progress in implementing the plan, but not as much as originally planned. While almost 20,000 acres of forest have been earmarked for thinning this year, the plan called for annual thinning of 40,000 to 60,000 acres. Proposed plans for next year include \$23.7 million from the U.S. Forest Service for thinning 30,000 acres and harvesting timber on 5,500 acres. Federal funding to reduce excess fuel load (e.g., heavy growth of brush) would lessen the severity of forest fire and presumably provide for biomass-to-energy facilities some lower-cost feedstocks (in the form of the removed materials). The cost of providing this feedstock would be borne by the federal taxpayer.

Proposition 204—Delta Tributary Watershed Program

Proposition 204 (<http://vote96.ss.ca.gov/Vote96/html/BP/204analysis.htm>), which was passed in 1996, allocated \$15 million dollars to implement the Delta Tributary Watershed Program (Division 24, Chapter 5, Article 5). Over the last three years, the CalFed Bay-Delta Program has funded projects under Article 5 to reduce contaminants in drinking water, increase watershed yield and retention, and improve forest health, including reducing the severity of wildfires in watersheds. Approximately \$5 million was allocated to local entities to reduce fuel loads and the severity of forest fires in northern California watersheds. Most Article 5 funds have now been allocated. Much of the biomass removed under the fuels reduction effort was mechanically cut, chipped, and returned to the forest floor to provide erosion control and nutrients and thus was not available to the biomass-to-energy industry. If it had been used as biomass feedstock, fuel costs would have been shifted from biomass-to-energy producers to the state taxpayer.

Local Government Construction and Demolition (C&D) Diversion Incentives

To meet the 50 percent diversion requirements of the Integrated Waste Management Act, the Alameda County Waste Management Authority has developed a model ordinance requiring project proponents to file a waste management plan for each construction, demolition or renovation project. Several cities in the Bay Area have adopted construction and demolition (C&D) incentive diversion ordinances. The city of Dublin requires projects of \$100,000 or greater to develop a plan to divert at least 50 percent of the debris generated by the project. The City of Oakland enacted a C&D waste reduction and recycling ordinance effective July 1, 2000. The City of San Jose adopted an ordinance that will go into effect July 2001. San Jose will collect a recycling deposit for a construction, demolition, or remodeling project when issuing a permit. The city will refund the deposit once the applicant demonstrates a pre-established percentage of material has been sent to a C&D facility. These C&D programs will increase the volume of urban wood material available for biomass solid fuel, reduce impacts on landfills, and, depending on C&D processing and transportation costs, reduce fuel cost to biomass electrical generators. These initiatives shift fuel cost from biomass-to-energy producers to the construction industry and property owners.

Additional Provisions That Have Been Proposed

NREL Policy Options

In its 2000 report, NREL identified nine policy options that individually or collectively would help sustain the biomass-to-energy industry over the long run.¹⁶ The first three options apply to power generation from all sources of biomass fuel, while the other six options target specific biomass residues. Of these, options 1 and 7 have been implemented in some form at the State level, while options 2, 3, and 4 have been proposed at the federal and State levels, respectively. The options are described below.

- 1) **Production Credit:** Provides funds to generators to produce electricity from biomass fuels. Funding can originate from the general fund or as a surcharge on statewide electric ratepayers. This option is incorporated as part of AB 1890, which created the renewables transition fund discussed above, and SB 1194 and AB 995, which extended the transition fund to January 1, 2012. Details of how this funding will be allocated are not final (see "Incentives For Renewable Energy Production").
- 2) **Income Tax Credit:** Broadens federal Energy Policy Act of 1992 to include all solid fuel biomass as eligible for an income tax credit of 1.5 ¢/kWh sold. This option has been proposed at the federal level (see "Internal Revenue Code Section 45" on page 12).

- 3) **Minimum Purchase Requirement:** Require the state to purchase a minimum amount of renewable energy or establish a renewables portfolio standard for electricity generated from biomass. The renewables portfolio standard would create a minimum statewide requirement for biomass energy production as a percentage of the overall supply mix. This was part of the CPUC's 1995 restructuring proposal (see "Reasons for the Decline" on page 3).
- 4) **Modified Integrated Waste Management Act Landfill Diversion Credits:** Remove the cap on diversion credit for facilities that use biomass fuel and allow jurisdictions to receive additional credit towards the state goal of 50 percent solid waste diversion from landfills. This option has been proposed at the State level (see "Proposed Modifications of AB 939 Landfill Diversion Credits" on this page).
- 5) **Grants and Loans for Wood Grinding/Fuel Production Equipment:** Provide grants and loans to transfer stations and landfills for biomass fuel production equipment. An increased supply in fuel could lead to lower fuel costs.
- 6) **Open Burning Permits and Fees:** Require permits and fees for burning agricultural residue to offset the cost to process and transport forest and agricultural residue to biomass facilities.
- 7) **Agricultural Fuels Production or Tax Credit:** Provides production credit or tax credit to cover the cost of collecting and processing agricultural residue for biomass fuel, instead of open burning of those residues. This option has been implemented in the form of the Agricultural Biomass-to-Energy Incentive Grant Program, administered through the Trade and Commerce Agency (see "Agricultural Biomass-to-Energy Incentive Grant Program" on page 9).
- 8) **Wildfire Prevention Credits:** Increase State/federal funding to reduce forest loads through mechanical thinning operations on public and private lands.
- 9) **Water Production Credits:** Increase water production through mechanical thinning and prescribed fire operations in state's densely wooded forests, with funding from surcharges on commercial water sales.

Proposed Modifications of Integrated Waste Management Act Landfill Diversion Credits

AB 1939 (Vincent, Margett) and AB 2067 (Washington), both introduced—but not passed—in the 1999–2000 Session of the California State Legislature, contained identical language to provide increased Integrated Waste Management Act diversion credit for non-burn biomass conversion technologies. Under existing law, local governments may use transformation (defined in Public Resources Code 40201 as "incineration, pyrolysis, distillation, gasification, or biological conversion other than composting") to count for 10 percent of the 50 percent diversion requirement, provided that all feasible waste reduction and recycling programs have been implemented and that the transformation facilities were permitted and operational before January 1, 1995. AB 1939 and AB 2067 would have defined "non-burn transformation" for purposes of the 50 percent diversion requirement as pyrolysis, distillation, gasification, or biological conversion and would have allowed non-burn transformation to count as any portion of the 50 percent requirement. This allowance could have increased the supply of fuel available to the non-burn biomass technologies and reduced fuel costs. Both bills were withdrawn at the request of the authors.

AB 802 (Dickerson, 2001–2002 Legislative Session), introduced in February 2001, would remove the 10 percent limit on diversion credit that may be met through biomass conversion.

Proposed State Tax Credit for Agricultural Prunings

AB 1641 (Cardoza, Maldonado), introduced by the Committee on Agriculture in the 1999–2000 Session of the California State Legislature, would have provided a \$30-per-ton tax credit to agricultural growers for agricultural prunings delivered to and used by a biomass-to-energy facility. The intent of the bill was to provide incentive to growers to deliver lower cost fuel to these facilities. The tax credit would have remained in effect for 10 years (1999 to 2009) and shifted biomass fuel cost to the state taxpayer. This bill died in committee.

Reviewer Suggestions

Steering Committee members (see Appendix) reviewed a draft of this report and provided the following additional recommendations:

- 1) Establish a new grant or loan program for fuel processing equipment at landfills and transfer stations.
- 2) Use part of the \$10 billion in State funds allocated to the Department of Water Resources (see “The Public Policy Framework as of Mid-April 2001,” below) to establish a long-term contract between the State and existing biomass-to-energy facilities. Such a contract would guarantee a long-term price, thus enabling the biomass-to-energy industry to recover and expand in California.
- 3) Provide support for siting new biomass-to-energy facilities at “brownfield” sites where industrial activity once occurred and that are still zoned industrial (e.g., sites where timber mills once operated). The general advantage of this option is that acquiring permits might not be as difficult or time-consuming as at a new “greenfield” facility, since appropriate zoning and some infrastructure is more likely to be in place at the brownfield sites.

The Public Policy Framework As Of Mid-April 2001¹⁷

The recent profits earned by biomass-to-energy power generators, especially the very high on-paper profits during late 2000 and early 2001, could call into question the need for future cost-shifting programs. However, biomass-to-energy power generators have not actually been paid for the electricity they produced under the high rates of the last several months, and there is no guarantee of payments in the future for this already-delivered electricity. As a result, many facilities are in a weak financial position, despite the very high profits they appear to be earning on paper. Moreover, the wholesale power rates of the past several months almost certainly will not last into the future. The prices that were being charged at the PX were simply too high to be sustainable, and the PX market was closed at the end of January 2001.

These two issues—lack of payment by utilities for electricity already produced and uncertainty about future energy prices—frame the debate about providing support for existing and idled biomass-to-energy facilities. Industry representatives indicate that the most pressing issue for the biomass-to-energy industry as a whole is for operators to be paid for the electricity that they have generated and sold, but for which they have not been paid. If these facilities are not paid, some of them may be forced to close down due to lack of revenue to pay their own debt, purchase fuel, etc. Furthermore, while energy prices are currently high, the industry is concerned that there is no guarantee that prices will remain so over the long term.

Industry representatives indicate that about 10 to 11 of the 17 now-idle plants, with a combined capacity of 100 to 150 MW, could be operational by mid-year if certain conditions are met. Biomass-to-energy operators are willing to reopen facilities if they can enter into long-term fixed price contracts with fixed energy rates (at a level considerably lower than current market prices) over a five-year period. However, the industry as a whole is unwilling to enter into these contracts prior to being paid what is owed by utilities. These representatives believe the State could help in

having past debts paid, by establishing mechanisms such as bridge loans to utilities, with recovery of the loans from future rate revenues and with the loans backed by the State.

Beyond the issue of payments for electricity already generated, the industry representatives suggest the following:

- 1) Supporting State policy that requires long-term contracts between utilities and biomass-to-energy facilities for the purchase of energy from these facilities.
- 2) Supporting State policy that establishes a minimum purchase requirement for all renewable energy which would help guarantee future markets.
- 3) Requesting that the Governor work with California's Congressional delegation to amend Internal Revenue Code Section 45.
- 4) Supporting the provision of financial incentives over the short term to assist in bringing facilities on line, including, but not limited to, (1) expanding the current State grant program for biomass fuel use and (2) ensuring that eligibility for "production transition payments" provided by the California Energy Commission includes idled biomass-to-energy plants that come on line, under the same terms as for currently operating facilities.

To cope with the overall energy crisis, the Governor requested a special session of the Legislature to pass emergency laws that turn the State into a major participant in the electricity market. Legislation passed in early February 2001 (ABX1 1, Chapter 4, Statutes of 2001, Keeley) authorized the State to enter into long-term contracts with out-of-state suppliers to purchase electricity on behalf of consumers. In March, the California Department of Water Resources announced the signing of forty contracts with various companies that average 7.9 ¢/kWh over the next five years and 6.9 ¢/kWh over the next decade.

Appendix 1

Steering Committee

Craig Bodenhausen	U.S. Forest Service (Placerville, California)
Loyd Forrest	TSS Consultants (Rancho Cordova, California)
Bob Herkert	California Rice Commission (Sacramento, California)
Robert Judd	California Biomass Energy Alliance (Sacramento, California)
Gregory P. Morris, Ph.D.	Future Resources Associates, Inc. (Berkeley, California)
Steve Shaffer	California Department of Food and Agriculture
John Sheehan	Plumas Corporation (Quincy, California)
George Simons	California Energy Commission
Michael Theroux	Theroux Environmental Consulting Services (Auburn, California)
Chris Trott	Ogden Energy (Jamestown, California)
Tony Wetzel	Thermo ECOtek Corporation (Roseville, California)
Catherine Witherspoon	California Air Resources Board
Michael Tollstrup	California Air Resources Board
Doug Wickizer	California Department of Forestry and Fire Protection
David Allen	CMS Energy (Redding, California)
Raymond Costello, Ph.D	Office of BioPower, U.S. Department of Energy (Washington, D.C.)

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(2) California Energy Commission, *In-State Installed Capacity and Dependable Capacity in California*, www.energy.ca.gov/electricity/capacity.html.

² Ibid.

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⁶ Conversation, Gregory Morris, Future Resources Associates, Inc., Berkeley, California.

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⁸ Gregory Morris, *Biomass Energy Production in California: The Case for a Biomass Policy Initiative*, National Renewable Energy Laboratory (NREL), Golden, Colorado, November 2000, p. 65.

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¹⁰ Gregory Morris, *Report to the California Integrated Waste Management Board: Cost-Shifting Issues for California Biomass Energy Production*, March 8, 2001, pp.1-4.

¹¹ Conversation, Robert Judd, California Biomass Energy Alliance, Sacramento, California.

¹² Morris, *Report to the California Integrated Waste Management Board: Cost-Shifting Issues for California Biomass Energy Production*, p. 2.

¹³ Conversation, Robert Judd, California Biomass Energy Alliance, Sacramento, California.

¹⁴ Gregory Morris, *Biomass Energy Production in California: The Case for a Biomass Policy Initiative*, National Renewable Energy Laboratory (NREL), Golden CO, November 2000, p. 28.

¹⁵ Conversation, Robert Judd, California Biomass Energy Alliance, Sacramento, California.

¹⁶ Morris, *Biomass Energy Production in California: The Case for a Biomass Policy Initiative*, p. 68.

¹⁷ Much of this information is taken from *Report to the California Integrated Waste Management Board: Cost-Shifting Issues for California Biomass Energy Production*, by Gregory Morris, March 8, 2001.