

# **Biomass Power and State Renewable Energy Policies Under Electric Industry Restructuring**

**Preprint**

Kevin Porter  
*National Renewable Energy Laboratory*

Ryan Wiser  
*Ernest Orlando Lawrence Berkeley National Laboratory*

*To be presented at Bioenergy 2000  
Buffalo, New York  
October 15–19, 2000*



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Contract No. DE-AC36-99-GO10337

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# **BIOMASS POWER AND STATE RENEWABLE ENERGY POLICIES UNDER ELECTRIC INDUSTRY RESTRUCTURING**

Kevin Porter

National Renewable Energy Laboratory  
901 D St., SW, Suite 930  
Washington, D.C. U.S.A. 20024

Ryan Wisser

Ernest Orlando Lawrence Berkeley National Laboratory  
One Cyclotron Road MS 90-4000  
Berkeley, CA 94720

## **ABSTRACT**

Several states are pursuing policies to foster renewable energy as part of efforts to restructure state electric power markets. The primary policies that states are pursuing for renewables are system benefits charges (SBCs) and renewable portfolio standards (RPSs). However, the eligibility of biomass under state RPS and SBC policies is in question in some states. Eligibility restrictions may make it difficult for biomass power companies to access these policies. Moreover, legislative language governing the eligibility of biomass power is sometimes vague and difficult to interpret. This paper provides an overview of state RPS and SBC policies and focuses on the eligibility of biomass power. For this paper, the authors define biomass power as using wood and agricultural residues and landfill methane, but not waste-to-energy, to produce energy.

**Keywords:** Renewable portfolio standards, system benefits charge

## **INTRODUCTION**

After a whirlwind of activity during the 1990s, the rate of electric restructuring throughout the states is beginning to slow. Even so, 25 states (including the District of Columbia) have firm plans to introduce electric restructuring. Many of these states (17 in total) have established renewable portfolio standards (RPSs) and system benefit charges (SBCs), or both, targeted, at least in part, towards renewable energy.

The RPS allows policy makers to require that a minimum percentage of a state’s annual electric use come from renewable energy. To implement the policy, a renewables purchase requirement (typically a percentage of sales of electricity) is imposed on retail suppliers of electric power. To add flexibility in meeting the purchase requirement, individual obligations can be tradable through a system of renewable energy credits. As Table 1 shows, an RPS has now been adopted in ten states: Arizona, Connecticut, Maine, Massachusetts, Nevada, New Jersey, New Mexico, Pennsylvania, Texas, and Wisconsin. Credit trading is being considered in many states but, to date, has only been adopted in Texas. When its policy took effect in March 2000, Maine became the first state to have operating experience with an RPS. Several other states are well along in developing the implementation details of their RPS policies.

**Table 1. RPS Policies Established at the State Level**

State	Renewables Standard Level	Resource Eligibility
Arizona	0.2% in 2001; 0.8% by 2004; 1.1% for 2007–2012 after review in 2004; 50% solar	At least 50% solar electric until 2004 and 60% solar after that—remainder from R&D, solar hot water, or other in-state landfill gas, wind and biomass.
Connecticut	Class I or II Technologies: 5.5% in 2000, 7% in 2009; Class I Technologies: 0.5% in 2000, 6% in 2009	Class I: solar, wind, new sustainable biomass, landfill gas, and fuel cells; Class II: licensed hydro, MSW, other biomass
Maine	30% in 2000 and thereafter	Fuel cells, tidal, solar, wind, geothermal, hydro, biomass, and MSW (< 100 MW); high efficiency cogeneration of any size
Massachusetts	1% in 2003, 4% in 2009, and increasing 1% per year, all from new renewables in service after 1997	Solar, wind, ocean thermal, wave, or tidal, fuel cells using renewable fuels, landfill gas, and low-emission, advanced biomass
Nevada	0.2% in 2001, 1% in 2009	50% from new (after July 1997) solar electric or solar thermal that offsets electric use; remainder from wind, solar, geothermal, and biomass energy resources in Nevada that are naturally regenerated
New Jersey	Class I or II Technologies: 2.5%; Class I Technologies: 0.5% in 2001, 4% in 2012	Class I: solar, PV, wind, fuel cells, geothermal, wave or tidal, and methane gas from landfills or a biomass facility, provided that the biomass is cultivated and harvested in a sustainable manner; Class II: hydro and resource recovery facilities in states with retail competition; draft RPS rule would limit hydro to under 30 MW
New Mexico	5% of energy to serve standard-offer customers	Wind, solar, geothermal, biomass, hydro, and fuel cells
Pennsylvania	For PECO, West Penn, and PP&L, 20% of residential customers served by competitive default provider: 2% in 2001, increasing 0.5% per year; for GPU, 0.2% in 2001 for 20% of customers, increasing to 80% in 2004	Non-hydro renewables
Texas	New and existing renewables: 1280 MW by 2003, 2880 MW by 2009 (2000 MW must come from new renewable resources)	Solar, wind, geothermal, hydro, wave, tidal, biomass, biomass-based waste products, landfill gas
Wisconsin	0.5% by 2001, increasing to 2.2% by 2011 (0.6% can come from pre-1998 facilities)	Wind, solar, biomass, geothermal, tidal, fuel cells that use renewable fuel, hydro under 60 MW

SBCs are a way to collect funds from electric customers to support various “public benefit” policies, including renewable energy programs. SBCs are typically proposed as a volumetric fee on electric use, such as a cents per kilowatt-hour (kWh) adder imposed on all electricity users through their electric rates. Once SBC funds are collected, methods of distribution must be devised. SBCs encompassing renewables have been adopted in 12 U.S. states: California, Connecticut, Delaware, Illinois, Massachusetts, Montana, New Jersey, New Mexico, New York, Pennsylvania, Rhode Island, and Wisconsin (see Table 2). California, Connecticut, Illinois, Montana, New York, Pennsylvania and Rhode Island have begun to distribute funds to renewables projects.

**TABLE 2. SBC Policies Established at the State Level**

State	Level of Support for Renewables	Resource Eligibility
California	\$135 million per year for four years beginning in 1998	Non-utility, in-state solar, wind, biomass, geothermal, MSW, and small hydro (less than or equal to 30 MW)
Connecticut	Approximately \$14 million per year in 2000; \$30 million per year in 2004 and thereafter	Wind, solar, fuel cells, ocean, landfill gas and low-emission advanced biomass technologies.
Delaware	\$1.5 million per year for renewable energy and energy efficiency	Not determined yet.
Illinois	\$5 million per year for 10 years beginning in 1999; also a \$250 million clean energy fund	Wind, solar thermal, PV, dedicated biomass and organic waste biomass, retrofit or expansion of existing hydro
Massachusetts	Approximately \$26 million per year from 1998 on	New solar, wind, ocean, advanced biomass, fuel cells; limited eligibility for waste-to-energy for first five years
Montana	Approximately \$2 million per year, 1999–2003	Renewable generators constructed after January 1, 1999
New Jersey	About \$32 million per year, 2000–2007, with review after 8 years	Solar, wind, fuel cells, geothermal, wave or tidal, and methane gas from landfills or a biomass facility, provided that the biomass is cultivated and harvested in a sustainable manner. Natural gas fuel cells also eligible.
New Mexico	\$4 million per year beginning in 2001	Solar, wind, hydro, geothermal, landfill gas, anaerobic digesters, and biomass-based fuel cells
New York	\$15 million for three years beginning in 1999	Wind, solar, biomass
Oregon	\$8.7 million annually for 10 years	Wind, waste, solar, geothermal, landfill gas, digester gas, energy crops, low-emission biomass based on solid organic fuels, and hydro facilities outside protected federal areas
Pennsylvania	\$11 million per year fund, including renewables, 1999–2005; Renewable Energy Pilot Fund raises \$3.9 million per year, 2001–2002	Renewable Energy Pilot Fund mostly focused on solar; one utility has proposal for small wind program.
Rhode Island	Approximately \$2 million per year 1998–2002	Wind, solar, sustainable biomass, small hydro under 100 MW that do not require new dams
Wisconsin	Approximately \$3.6 million per year	Eligible technologies include solar thermal, photovoltaics, wind, geothermal, biomass, fuel cells powered by renewables, and hydro under 60 MW

The scope, nature, and design of the RPS and SBC policies differ substantially by state, reflecting different policy objectives, renewable resource endowments, and the existing levels of renewables infrastructure. For example, the size of RPSs vary from 1% in Nevada to 30% in Maine, whereas annual SBC funding ranges from roughly \$1 million in

Delaware to \$135 million in California. Although some of the SBCs are designed to operate for a lengthy or indefinite period, the SBC design life in four states is just three to five years. State RPS policies, on the other hand, have generally been designed to operate for longer periods. Two states (Connecticut and New Jersey) have two-tiered RPS policies—one tier for new or emerging renewable resources, including sustainable or low-emission biomass (Class I) and a second tier for existing renewable resources, mostly biomass, municipal solid waste (MSW) and hydro (Class II). And although the statutory language is vague and difficult to read, the Massachusetts RPS could conceivably allow for a two-tiered RPS among existing and new renewables. However, the Massachusetts Division of Energy Resources recently decided not to adopt an RPS for existing renewables, primarily because of uncertainty over the eligibility of large hydro resources in New England.

The difference in RPS levels and SBC funding by state illustrate the diversity of approaches each state has taken. How much impact these state RPS and SBC policies will have will depend critically on how states design and implement these policies. Although it is premature to report on the empirical evidence of state RPS and SBC policies, there already are a few examples of policy design problems to report. For instance, Maine's 30% RPS appears aggressive at first glance. But, because Maine allows certain hydro and high-efficiency cogeneration systems serving the New England grid to qualify under its RPS, and because Maine's current electricity mix already contains 45-50% renewable energy (without cogen), the eligible supply will far exceed the purchase requirement. The net result should be strong downward pressure on price; consequently, the RPS is unlikely to foster new renewable energy generation and may even fail to provide meaningful support to existing generators. Separately, in four states with SBCs, the policies are authorized for just three to five years. While extension of these programs is possible, it will be difficult to create lasting change in the renewables industries with fleeting policy commitments; a long-term vision is needed.

Specific to biomass power, several states have restricted the eligibility of biomass to benefit from RPS or SBC policies. The ability of biomass power companies to utilize state RPS and SBC policies will depend critically on how these eligibility are defined and implemented. The remainder of this paper will examine these restrictions, examine possible reasons for these restrictions, and consider some of the resulting implications for biomass power.

## **BIOMASS PROVISIONS IN STATE RENEWABLE ENERGY POLICIES**

Of the 17 states that have adopted renewable energy policy measures as part of electric restructuring, nine have put some form of restriction on the eligibility of biomass. Most of the restrictions are tied to air emissions or resource sustainability. Table 3 categorizes biomass restrictions by state RPS or SBC policies, and Table 4 (found on the following page) provides more detail on the biomass provisions.

**TABLE 3. Biomass Eligibility in State RPS and SBC Policies**

Sustainable Biomass	Low-Emission Biomass	Biomass Residues Ineligible	Co-firing Eligible <sup>c</sup>	Co-firing Ineligible	No Restrictions on Biomass
Connecticut <sup>a</sup> Nevada New Jersey Rhode Island	Connecticut <sup>b</sup> Massachusetts Oregon	Illinois New Mexico	California <sup>d</sup> Maine <sup>d</sup> Wisconsin	Texas	Arizona California Maine <sup>e</sup> Montana New York Pennsylvania Texas Wisconsin

<sup>a</sup> For the RPS

<sup>b</sup> For the SBC

<sup>c</sup> Eligibility of co-firing under consideration in Massachusetts and in Nevada but is unclear in other states

<sup>d</sup> Follows PURPA definition allowing 25% fossil fuel input for small power renewables

<sup>e</sup> 100 MW capacity restriction for all renewable energy technologies

Policy restrictions on biomass are almost evenly divided between a focus on sustainability and low emission. In some states, both restrictions are present. Although its meaning differs from state to state, four states include “sustainability” when defining biomass eligibility for either the RPS or SBC. The Connecticut and New Jersey RPSs state that biomass must be “cultivated and harvested in a sustainable manner.” Nevada’s RPS policy requires biomass to be “naturally regenerated.” Rhode Island simply requires that biomass be “sustainably managed.” So far, none of the four states have clarified their definitions any further. This is because, in part, Nevada and New Jersey have yet to finalize their RPS policies, Connecticut is just putting its in place, and Rhode Island has focused more on wind, solar, fuel cells, and expanding an existing landfill methane project. Staff from the New Jersey Board of Public Utilities report that the definition of biomass for that state’s RPS would have been taken from President Clinton’s August 1999 Bioenergy Executive Order, but the issue is under review. President Clinton’s executive order defines biomass as “any organic matter that is available on a renewable or recurring basis including dedicated energy crops and trees, agricultural food and feed crop residues, aquatic plants, wood and wood residues, animal wastes, and other waste materials [excluding old-growth timber].” (Clinton 1999). The Connecticut Department of Public Utility Control has not yet interpreted the biomass provisions of their RPS and will await either a request for an advisory ruling by a retail supplier (or a claim by a retail supplier of a sustainable biomass project for compliance with that state’s RPS) before deciding what qualifies as a sustainable biomass project.

**TABLE 4. Biomass Provisions in State RPS and SBC Policies**

<b>State</b>	<b>Eligibility of Biomass</b>
Arizona	Biomass resource must be in-state
California	Biomass must be in-state, must not be utility-owned, and must be off the fixed-price portion of the utility power purchase contracts
Connecticut	For the RPS, a biomass generator is a Class I renewable if facility began operating after July 1998, and if the biomass fuel “is cultivated and harvested in a sustainable manner”; Class II renewable applies to existing MSW and biomass facilities that do not meet Class I definition; low-emission advanced biomass conversion technologies are the only biomass technology eligible for the SBC
Delaware	To be determined
Illinois	Dedicated crops for energy production and organic waste biomass (animal manure, crop residues, wastewater sludge); construction debris, waste wood, and office waste are not allowed
Maine	Biomass under 100 MW; high-efficiency co-generation of any size qualifies
Massachusetts	Existing biomass and MSW meeting certain air emission limits are eligible for existing RPS, should one be designed. Only low-emission, advanced biomass eligible for “new” tier of RPS; considering an NOx-based criteria to qualify advanced biomass; incremental generation from retrofitted biomass may qualify if emission threshold met; recommended that biomass co-firing be eligible as long as emissions threshold met (only the renewables output qualifies); considered “new” on case-by-case basis
Montana	Biomass eligible for SBC funds; Montana Power expressed preference for solar, wind, and geothermal in 1999 RFP; RFP in 2000 only for wind
Nevada	Biomass must be “naturally regenerated”; precise definition under negotiation in stakeholder group
New Jersey	Biomass and MSW qualifies for Class II tier (2.5% RPS); only biomass harvested in sustainable manner qualifies for Class I RPS tier
New Mexico	Renewables must be low or zero emissions; biomass limited to landfill gas, anaerobic digestion, or fuel cells
New York	Biomass eligible; focus has been on growing of willow trees for biomass co-firing
Pennsylvania	Biomass eligible for RPS and SBC
Oregon	Dedicated energy crops “available on a renewable basis,” landfill methane, digester gas, and “low-emission nontoxic biomass based on solid organic fuels from wood, forest and field residues”
Rhode Island	Sustainably managed biomass
Texas	Biomass and biomass-based waste products qualify, including landfill gas; excludes waste products from inorganic sources; Biomass co-firing essentially not allowed—fossil co-firing limited to 2% of annual fuel input; existing fossil plants cannot be repowered to use renewable fuels
Wisconsin	RPS only applies to electric utilities; biomass and biomass co-firing eligible

Three states have adopted a low-emissions eligibility threshold for biomass. Biomass is eligible for SBC funds in Oregon if it is low emission and nontoxic and comes from wood or agricultural residues. The Connecticut SBC and the Massachusetts RPS both use “low emission and advanced” eligibility thresholds. In Massachusetts, biomass qualifies if it meets certain air emission limits and commenced operations after the end of 1997. Out-of-state biomass plants would have to meet air emission levels (probably for NOx and particulates) set by the DOER and the Massachusetts Department of Environmental Protection. Connecticut has not yet adopted definitive guidelines, although the SBC fund administrator is considering financial support of a biomass gasification proposal.

Two states (Illinois and New Mexico) have precluded certain biomass fuels from qualifying for SBC funds. Illinois does not allow construction debris, wood residues, or office waste to receive SBC funds but does allow energy crops, animal manure, crop residues, and wastewater sludge to receive the funds. New Mexico allows landfill gas or anaerobic digestion, as well as fuel cells that may have biomass feedstocks as a fuel to qualify for SBC funds.



Other states allow biomass to qualify for RPS or SBC policies, but funding administrators prefer other renewable energy technologies. In Montana, biomass is eligible for SBC funds, but Montana Power (the state's largest utility) expressed a preference for wind and solar in its 1999 renewable energy RFP. In May 2000, the utility released another RFP limited to wind energy.

The eligibility of biomass co-firing for state RPS policies varies by state. Wisconsin explicitly permits biomass co-firing as an eligible technology, whereas Texas does not. Biomass co-firing is under consideration for the Massachusetts and Nevada RPSs. Biomass co-firing with fossil fuels is not as likely to be eligible for SBC funding because legislative language usually prohibits SBC funds being used for coal, natural gas, oil, and nuclear power plants. Connecticut's SBC, for example, limits eligible projects to those that "do not involve the combustion of coal, petroleum or petroleum products, municipal solid waste, or nuclear fission."

### **POSSIBLE REASONS FOR BIOMASS RESTRICTIONS**

The reasons for restrictions on the eligibility of biomass for state RPS and SBC policies are difficult to determine. Some restrictions may be the result of a political bargaining process that occurred when electric restructuring legislation was being debated in state legislative chambers. Other possible reasons are listed below and are based more on the author's own thinking than on definitive statements from legislative, regulatory, or political stakeholders.

*Promotion of New Renewable Energy Projects:* Electric restructuring often occurred in states that aggressively implemented the Public Utility Regulatory Policies Act (PURPA) and stimulated some renewable energy capacity, including biomass. State RPS and SBC policies seem focused on stimulating new renewable energy projects rather than protecting what was developed under PURPA. This may be because PURPA contracts are still active for some years to come, although the terms and conditions may change over time. Some of this may be a result of the belief that years of above-market buyback rates provide enough policy support, and that existing renewable energy projects must be able to compete in the restructured market or fail.

*Concern over Air Emissions:* A report released by the Clean Air Network found that more than half of the U.S. counties that measure smog levels consistently exceed U.S. Environmental Protection Agency (EPA) air quality standards for ozone (Mardock and Porreco 2000). A total of 117 million people live in those counties. The high ozone levels are caused by nitrous oxides (NO<sub>x</sub>), which are a by-product of fuel combustion processes (primarily burning fossil fuels in automobiles, power plants, and industrial heating applications), and volatile organic compounds, which are emitted primarily by vehicles and certain industrial processes. Other pollutants of concern include carbon monoxides and particulates. Concerns over air quality may have driven the state legislative provisions to encourage lower-emitting forms of biomass such as biomass gasification.

*Resource Concerns:* Various environmental groups are worried that an increase in biomass power capacity may result in additional clearcutting of forests and overuse of farming lands for energy crops. For urban wood residues, there is strong desire among environmental groups to exclude painted, treated or pressurized urban wood residues.

*Non-Power Uses for Biomass Residues:* Although not often directly referenced in restructuring debates, there has been stakeholder support for encouraging non-power applications for biomass residues such as textiles, paper, construction products, liquid fuels, solid fuels, compost, mulch, animal bedding, chemicals, and fertilizer (Morris and Nelson, 2000).

## **IMPLICATIONS FOR BIOMASS POWER**

Electric restructuring has provided a one-time opportunity to readdress renewable energy policy and implementation. State RPS and SBC policies appear to be a common element in many state electric restructuring initiatives and, as such, are providing a boost to renewable electric markets. However, various eligibility restrictions may make it difficult for biomass energy companies to access these policies. To qualify, biomass power developers will have to develop different types of biomass projects or retrofit existing biomass power projects. Clearly, the biomass power community needs to take note of public policy trends that favor sustainable, low-emission, or other types of biomass in RPS and SBC policies. These public policy trends may, in turn, have a number of impacts on biomass power.

First, existing biomass power facilities are not likely to get substantial public policy support once their PURPA contracts expire, except in perhaps a small number of states. This could mean a further decrease in biomass power capacity unless a viable green power market emerges. So far, the green power market has been relatively small. Alternatively, biomass developers may consider repowering their facilities and adding incremental capacity to qualify for the “new” (Class I) tier of RPS policies in Connecticut, Massachusetts, and New Jersey. Under some proposals, any incremental capacity beyond the plant’s base capacity may be counted as “new” renewables in a state RPS. This is an important consideration in some states because a new tier of an RPS may be the “market maker” for renewable energy technologies.

Second, the use of terms such as “sustainable biomass” and “low-emission biomass” introduce substantial uncertainty over which biomass fuels do and do not qualify. This uncertainty could be a considerable market barrier to biomass power and could prevent biomass power from taking advantage of the opportunities these state RPS and SBC policies can offer.

Third, the eligibility of biomass co-firing within these policies is in doubt. A small number of states either explicitly allow or do not allow co-firing, but, generally, the eligibility of biomass co-firing is undefined in most states. Issues regarding the eligibility of biomass co-firing concern whether it is classified as “new” (because biomass is a new

fuel source) or “existing” (because biomass co-firing involves an existing power plant). Additionally, because only the biomass portion of a co-fired plant will count towards an RPS, measuring the biomass contribution will require BTU estimations and conversions because the biomass input into a co-fired unit cannot be separately metered in most instances. To make co-firing eligible, the biomass community will need to show how these issues can be overcome and that there will be net environmental improvements. This will likely have to be done before a skeptical state regulatory commission, external stakeholders, or both.

Fourth, even in states with policy support for existing biomass, the policy support may be transitory and short-lived. The California SBC, for example, expires in 2001, and prospects for renewal are highly uncertain. Legislation to extend the SBC is considered a tax and will require a two-thirds affirmative vote for passage. SBC provisions in Montana and New York also expire in 2001 and in Rhode Island in 2002. In other states, such as Delaware and Nevada, SBC and RPS policies are small enough that they may not provide much of a market boost for biomass power.

Finally, while there are some potentially negative repercussions for biomass power, there are also some potential opportunities. The focus on sustainability may be an opportunity for biomass energy crops and biomass gasification. For example, SBC administrators in Connecticut and Massachusetts have expressed interest in biomass gasification projects.

While this paper is focused on state initiatives, one cannot discount national policy from supplementing or even supplanting these state policies. Skyrocketing gasoline prices have refocused public attention on energy policy for the first time in more than 20 years. And energy policy may be a primary topic in this fall’s presidential campaign. Whether Congress enacts significant energy legislation is very much in doubt. As of this writing, partisan debate will postpone consideration of a national electric restructuring until another session of Congress, in part because of differences over whether a national renewable energy requirement is necessary. At least for the near future, state RPS and SBC policies will drive markets for renewable energy technologies.

The biomass community would be well served to be active in state RPS and SBC deliberations. Implementation of these policies is at an early stage in many states. In fact, most states that use the terms “low-emission” or “sustainable” biomass in their RPSs and SBCs have not attempted to define those terms. Juggling a myriad of issues and the regulation of other industries, state regulators likely would welcome assistance in defining those terms. In addition, shaping and defining state policies represents a one-time opportunity for adding more biomass capacity—or keeping the existing fleet of biomass plants in operation. Not participating in policy implementation could mean that biomass eligibility restrictions could be relatively strict, or even undefined. That effectively could largely blunt the positive impact of state RPS and SBC policies on markets for biomass power.

## SUMMARY

RPS and SBC policies for renewable energy technologies continue to be a popular feature of state electric restructuring laws. Seventeen of the 25 states that have enacted electric restructuring include one or both of these policies, yet many of these policies contain potentially severe restrictions on the eligibility of biomass, if not outright exclusion. Given these policy restrictions, a key challenge for the biomass power industry will be to prevent the further attrition of existing biomass power capacity. Generally, these restrictions are vaguely worded and defined, and, in some cases, implementation will surely be tricky and controversial. To take advantage of RPS and SBC policies, biomass power advocates should consider participating in—even leading—efforts to define “sustainable biomass” and “low-emission biomass.” Biomass power developers may also need to retrofit their facilities, change biomass fuel sources, or make other operational changes in order to meet low-emission requirements that may be adopted as part of RPS policies. Alternatively, biomass power developers may wish to tap into SBC funds in various states that have expressed interest in biomass gasification technologies.

## ACKNOWLEDGMENTS

The work described in this study was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Power Technologies of the U.S. Department of Energy (DOE), under Contracts No. DE-AC36-98-10337 and DE-AC03-76SF00098. The author thanks Ray Costello (DOE) and Kevin Craig (The National Renewable Energy Laboratory’s (NREL) Biomass Power Program) for their support of this work, and to Ruby Nathan of NREL for editing an early draft. The authors also thank Wade Amos, Lori Bird, Eldon Boes, Larry Goldstein, and Margaret Mann (all of NREL); and Kevin Comer of Antares Corp., Dale Bryk of the Natural Resources Defense Council, and Julie Hashem of the Maine State Planning Office for their helpful comments. The U.S. government and NREL retain non-exclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. government purposes.

## REFERENCES

1. Clinton, President William Jefferson. (August 12, 1999). *Presidential Executive Order 13134: Developing and Promoting Biobased Products and Energy*.
2. Mardock, Jayne; Porreco, Gina. (June 2000). *Smog Watch 2000: Dirty Smog Spots and Clean Air Solutions*. Published by the Clean Air Network.
3. Morris, David; Nelson, Jessica. (Spring 2000). “The Burning Question.” *The Carbohydrate Economy*. Published by the Institute for Local Self-Reliance, pp. 1-2.