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Testimony

Before the Subcommittee on Forests and  
Forest Health, Committee on Resources,  
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# NATURAL RESOURCES

## Woody Biomass Users' Experiences Provide Insights for Ongoing Government Efforts to Promote Its Use

Statement of Robin M. Nazzaro, Director  
Natural Resources and Environment





Highlights of [GAO-06-694T](#), a testimony before the Subcommittee on Forests and Forest Health, Committee on Resources, House of Representatives

## Why GAO Did This Study

The federal government is placing greater emphasis on thinning vegetation on public lands to reduce the risk of wildland fire. To help defray the cost of thinning efforts, it also is seeking to stimulate a market for the resulting material, including the smaller trees, limbs, and brush—referred to as woody biomass—that traditionally have had little or no commercial value. As GAO has reported in the past, the increased use of woody biomass faces obstacles, including the high cost of harvesting and transporting it and an unpredictable supply in some locations. Nevertheless, some entities, such as schools and businesses, are utilizing the material, potentially offering insights for broadening its use.

GAO agreed to (1) identify key factors facilitating the use of woody biomass among selected users, (2) identify challenges these users have faced in using woody biomass, and (3) discuss any insights that these findings may offer for promoting greater use of woody biomass.

This testimony is based on GAO's report *Natural Resources: Woody Biomass Users' Experiences Offer Insights for Government Efforts Aimed at Promoting Its Use* (GAO-06-336).

[www.gao.gov/cgi-bin/getrpt?GAO-06-694T](http://www.gao.gov/cgi-bin/getrpt?GAO-06-694T).

To view the full product, including the scope and methodology, click on the link above. For more information, contact Robin M. Nazzaro at (202) 512-3841 or [nazzaror@gao.gov](mailto:nazzaror@gao.gov).

## NATURAL RESOURCES

# Woody Biomass Users' Experiences Provide Insights for Ongoing Government Efforts to Promote Its Use

## What GAO Found

Financial incentives and benefits associated with using woody biomass were the primary factors facilitating its use among the 13 users GAO reviewed. Four users received financial assistance (such as state or federal grants) to begin their use of woody biomass, three received ongoing financial support related to its use, and several reported energy cost savings over fossil fuels. Using woody biomass also was attractive to some users because it was available, affordable, and environmentally beneficial.

Several users GAO reviewed, however, cited challenges in using woody biomass, such as difficulty obtaining a sufficient supply of the material. For example, two power plants reported running at about 60 percent of capacity because they could not obtain enough material. Some users also reported that they had difficulty obtaining woody biomass from federal lands, instead relying on woody biomass from private lands or on alternatives such as sawmill residues. Some users also cited increased equipment and maintenance costs associated with using the material.

The experiences of the 13 users offer several important insights for the federal government to consider as it attempts to promote greater use of woody biomass. First, if not appropriately designed, efforts to encourage its use may simply stimulate the use of sawmill residues or other alternative wood materials, which some users stated are cheaper or easier to use than woody biomass. Second, the lack of a local logging and milling infrastructure to collect and process forest materials may limit the availability of woody biomass; thus, government activities may be more effective in stimulating its use if they take into account the extent of infrastructure in place. Similarly, government activities such as awarding grants or supplying woody biomass may stimulate its use more effectively if they are tailored to the scale and nature of the targeted users. However, agencies must remain alert to potential unintended ecological consequences of their efforts, such as excessive thinning to meet demand for woody biomass.

## Examples of Woody Biomass Users GAO Reviewed



Source: GAO.  
Pulp and paper mill.



Wood-fired heating facility at rural school.

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Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss factors influencing woody biomass use among several users we reviewed, as well as potential insights these users' experiences may offer as the federal government seeks to increase woody biomass use. As you know, the federal government has responded to our nation's increasing wildland fire threat by placing greater emphasis on thinning forests and rangelands to help reduce the buildup of potentially hazardous fuels. These thinning efforts are expected to generate large amounts of woody material, including many small trees, limbs, and brush—often referred to as woody biomass—that traditionally have had little commercial value.<sup>1</sup>

Widespread thinning efforts will be costly to the federal government. To help defray these costs, and to enhance rural employment and economic development, the government is promoting a market for woody biomass. However, as we have reported in the past,<sup>2</sup> increasing the use of the material faces several obstacles. Officials in federal agencies promoting woody biomass use—including the Departments of Agriculture, Energy, and the Interior—told us that its use is hampered by the high costs of harvesting and transporting it and the difficulty in obtaining a reliable supply in some areas. Nevertheless, some businesses and government entities are using woody biomass for various purposes, including heating buildings, making lumber, and generating electricity.

My testimony today summarizes the findings of our report being released today that discusses factors facilitating woody biomass use among selected users, the challenges these users faced in using the material, and the insights these users' experiences may have for the federal government as it seeks to promote greater use of woody biomass.<sup>3</sup> This report is based

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<sup>1</sup>Although biomass can be considered any sort of organic material—including trees, grasses, agricultural crops, and animal wastes—the term woody biomass in this testimony refers to small-diameter trees and other traditionally noncommercial material cut as part of thinning, harvesting, or other activities in forests or on rangelands. For the purposes of this testimony, we distinguish woody biomass from other wood residues such as sawmill residues or urban wood waste.

<sup>2</sup>See GAO, *Natural Resources: Federal Agencies Are Engaged in Various Efforts to Promote the Utilization of Woody Biomass, but Significant Obstacles to Its Use Remain*, [GAO-05-373](#) (Washington, D.C.: May 13, 2005).

<sup>3</sup>GAO, *Natural Resources: Woody Biomass Users' Experiences Offer Insights for Government Efforts Aimed at Promoting Its Use*, [GAO-06-336](#) (Washington, D.C.: Mar. 22, 2006).

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on information we collected from 13 users of woody biomass, including power plants, pulp and paper mills, and school and hospital facilities in various locations around the United States, as well as on our prior study of woody biomass.

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## Summary

The primary factors facilitating woody biomass use among users we reviewed were financial incentives and benefits associated with its use, while other factors included the availability of an affordable supply of woody biomass and users' interest in environmental benefits associated with its use. Four of the 13 users in our review had received federal or state financial assistance to begin using woody biomass, while 3 users received ongoing support as a result of their use of the material. Other factors included energy cost savings from using woody biomass in place of fossil fuels such as natural gas; the availability of an affordable supply of the material (particularly in cases where it was already being removed as a byproduct of other activities); and anticipated environmental benefits associated with using the material, such as promoting forest health and reducing air pollution.

Using woody biomass, however, was not without challenges for the users we reviewed. Users cited insufficient supply, increased equipment and maintenance costs, and other factors that limited their use of woody biomass or made it more difficult or expensive to use. Several users reported they found it difficult or impossible to obtain a sufficient supply of the material, particularly from federal lands. Such users relied more on woody biomass from private lands or on alternative wood materials such as sawmill residues (including sawdust, chips, bark, and similar materials) or urban wood waste (made up of tree trimmings, construction debris, and the like). Several users also told us that, despite the financial advantages of using woody biomass in place of oil or natural gas, they had incurred increased equipment, operation, and maintenance costs in using woody biomass that they would not have incurred had they burned the other fuels.

Our findings offer several insights for the federal government as it seeks to promote greater use of woody biomass. First, if not appropriately designed, efforts to encourage its use may instead stimulate the use of sawmill residues or other alternative wood materials, which some users told us are cheaper or easier to use than woody biomass. Second, the lack of a local logging and milling infrastructure to collect and process forest materials may limit the availability of woody biomass; thus, government activities may be more effective in stimulating its use if they take into

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account the extent of existing infrastructure. And finally, government activities such as awarding grants or supplying woody biomass may stimulate its use more effectively if they are tailored to the scale and nature of the targeted users. However, agencies must remain alert to potential unintended ecological consequences of their efforts, such as excessive thinning to meet demand for woody biomass.

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## Background

Woody biomass—small-diameter trees, branches, and the like—is generated as a result of timber-related activities in forests or on rangelands. Small-diameter trees may be removed to reduce the risk of wildland fire or to improve forest health, while treetops, branches, and limbs, collectively known as “slash,” are often the byproduct of traditional logging activities or thinning projects. Slash is generally removed from trees on site, before the logs are hauled for processing. It may be scattered on the ground and left to decay or to burn in a subsequent prescribed fire, or piled and either burned or hauled away for use or disposal.

Woody biomass can be put to various uses. Among other uses, small-diameter logs can be sawed into structural lumber or can be chipped and processed to make pulp, the raw material from which paper, cardboard, and other products are made. Woody biomass also can be used for fuel. Various entities, including power plants, schools, pulp and paper mills, and others, burn woody biomass in boilers to turn water into steam, which can be used to make electricity, heat buildings, or provide heat for industrial processes.

Federal, state, and local governments, as well as private organizations, are working to expand the use of woody biomass. Recent federal legislation contains provisions for woody biomass research and financial assistance. For example, the Consolidated Appropriations Act for Fiscal Year 2005 made up to \$5 million in appropriations available for grants to create incentives for increased use of woody biomass from national forest lands.<sup>4</sup> In response, the Forest Service awarded \$4.4 million in such grants in fiscal year 2005. State and local governments also are encouraging the material’s use through grants, research, and technical assistance, while private corporations are researching new ways to use woody biomass, often in partnership with government and universities.

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<sup>4</sup>Pub. L. No. 108-447, 118 Stat. 3076 (2004).

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## Financial Incentives and Benefits, Access to an Affordable Supply, and Environmental Benefits Facilitated the Use of Woody Biomass among Users We Reviewed

The users in our review cited several factors contributing to their use of woody biomass. The primary factors they cited were financial incentives and benefits associated with its use, while other factors included having access to an affordable supply of woody biomass and environmental considerations.

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### Financial Incentives and Benefits Encouraged Woody Biomass Use by Several Users

Financial incentives for, and benefits from, using woody biomass were the primary factors for its use among several users we reviewed. Three public entities—a state college in Nebraska, a state hospital in Georgia, and a rural school district in Montana—received financial grants covering the initial cost of the equipment that they needed to begin using woody biomass. The state college received a state grant of about \$1 million in 1989, the Georgia hospital received about \$2.5 million in state funds in the early 1980s, and the Montana school district received about \$900,000 in federal funds in 2003 for the same purpose.<sup>5</sup> A fourth user—a wood-fired power plant in California—received financial assistance in the form of tax-exempt state bonds to finance a portion of the plant’s construction.

Three users in our review also received additional financial assistance, including subsidies and other payments that helped them continue their use of woody biomass. For example, the California power plant benefited from an artificially high price received for electricity during its first 10 years of operation, a result of California’s implementation of the federal Public Utility Regulatory Policies Act of 1978.<sup>6</sup> Under the act, state regulators established rates for electricity from certain facilities producing it from renewable sources, including woody biomass. However, the initial prices set by California substantially exceeded market prices in some

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<sup>5</sup>Dollars are unadjusted for inflation.

<sup>6</sup>Pub. L. No. 95-617, 92 Stat. 3117 (1978).

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years, benefiting this user by increasing its profit margin.<sup>7</sup> The Montana school district also received ongoing financial assistance from a nearby nonprofit organization. The nonprofit organization paid for the installation of a 1,000-ton wood fuel storage facility (capable of storing over a year's supply of fuel) and financed the purchase of a year's supply of fuel for the district, which the district repays as it uses the fuel. The third user, a Colorado power plant generating electricity by firing woody biomass with coal, realized ongoing financial benefits by selling renewable energy certificates associated with the electricity it generated from woody biomass.<sup>8</sup>

Energy cost savings also were a major incentive for using woody biomass among six users we reviewed. Two users—rural school districts in Pennsylvania and Montana—told us that they individually had saved about \$50,000 and \$60,000 in annual fuel costs by using wood instead of natural gas or fuel oil. Similarly, the state college in Nebraska typically saves about \$120,000 to \$150,000 annually, while the Georgia state hospital reported saving at least \$150,000 in 1999, the last year for which information was available. And the two pulp and paper mills we reviewed each reported saving several million dollars annually by using wood rather than natural gas or fuel oil to generate steam heat for their processes.

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## An Affordable Supply Facilitated the Use of Woody Biomass

An affordable supply of woody biomass also facilitated its use, especially in areas where commercial activities such as logging or land clearing generated woody biomass as a byproduct. For example, the Nebraska state college was able to purchase woody biomass for an affordable price because logging companies harvested timber in the vicinity of the college, hauling the logs to sawmills and leaving their slash; the college paid only the cost to collect, chip, and transport the slash to the college for burning. Similarly, a Pennsylvania power plant obtains a portion of its wood fuel

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<sup>7</sup>States set rates, pursuant to general regulations issued by the Federal Energy Regulatory Commission, based on the buyer's "avoided cost"—this is, the energy and facilities costs that would have been incurred by the purchasing utility if it had to provide its own generating capacity. According to the commission, while it provides general avoided cost regulations, states set rates that often are above market rates.

<sup>8</sup>Renewable energy certificates represent the environmental benefits of renewable energy generation—that is, the benefits of displacing electricity generated from nonrenewable sources, such as fossil fuels, from the electric grid. The certificates are sold separately from the electricity with which they are associated, and their sale can serve as an additional source of revenue to power plants using such sources.

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from land-clearing operations in which, according to a plant official, the developers clearing the land are required to dispose of the cleared material but are not allowed to burn or bury it. The plant official told us developers often are willing to partially subsidize removal and transportation costs in order to have an outlet for it.

Thinning activities by area landowners also contributed to an affordable supply for a large pulp and paper mill in Mississippi. In this area, as in much of the southeastern United States, small-diameter trees are periodically thinned from forests to promote the growth of other trees, and traditionally have been sold for use in making pulp and paper. Further, according to mill officials, the level terrain and extensive road access typical of southeastern forests keep harvesting and hauling costs affordable—particularly in contrast to other parts of the country where steep terrain and limited road access may result in high harvesting and hauling costs.

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## Environmental Benefits and Other Factors Played a Role in the Use of Woody Biomass

Three users cited potential environmental benefits, such as improved forest health and air quality, as prompting their use of woody biomass; other users told us about additional factors that increased their use of woody biomass. Two users—the Montana school district and the coal-fired power plant in Colorado—started using woody biomass in part because of concerns about forest health and the need to reduce hazardous fuels in forest land. They hoped that by providing a market for woody biomass, they could help stimulate thinning efforts. Another user, a Vermont power plant, began using woody biomass because of air-quality concerns. According to plant officials, the utilities that funded it were concerned about air quality and as a result chose to build a plant fired by wood instead of coal because wood emits lower amounts of pollutants.

Other factors and business arrangements specific to individual users also made using woody biomass advantageous. For example, one user, which chips woody biomass for use as fuel in a nearby power plant, has an arrangement under which the plant purchases the user's product at a price slightly higher than the cost the user incurred in obtaining and processing woody biomass, as long as the product is competitively priced and meets fuel-quality standards. Three users whose operations include chipping of woody biomass and other activities, such as commercial logging or sawmilling, also told us that having the operations within the same business is important because equipment and personnel costs can be shared between the chipping operation and the other activities. And some users helped offset the cost of obtaining and using woody biomass by



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selling byproducts resulting from its use. One pulp and paper mill in our review sold turpentine and other byproducts from the production of pulp and paper, while a wood-fired power plant sold steam extracted from its turbine to a nearby food-canning factory. Other byproducts sold by users in our review included ash used as a fertilizer and sawdust used by particle board plants.

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### Challenges Faced by Woody Biomass Users Included Inadequate Supply and Costs Associated with Handling and Using the Material

Users in our review experienced several factors that limited their use of woody biomass or made it more difficult or expensive to use. These factors included an insufficient supply of the material and increased costs related to equipment and maintenance.

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### Woody Biomass Was Not Always Sufficiently Available

Seven users in our review told us they had difficulty obtaining a sufficient supply of woody biomass, echoing a concern raised by federal officials in our previous report. Two power plants reported to us that they were operating at about 60 percent of their capacity because they were unable to obtain sufficient woody biomass or other fuel for their plants. Officials at both plants told us that their shortages of wood were due at least in part to a shortage of nearby logging contractors, which prevented nearby landowners from carrying out all of the projects they wished to undertake. While officials at one plant attributed the plant's shortage entirely to the lack of sufficient logging contractors, an official at the other plant stated that the lack of woody biomass from federal lands—particularly Forest Service lands—also was a significant problem.

The lack of supply from federal lands was a commonly expressed concern among woody biomass users on the West Coast and in the Rocky Mountain region, with five of the seven users we reviewed in these regions telling us they had difficulty obtaining supply from federal lands. Users with problems obtaining supply from federal lands generally expressed concern about the Forest Service's ability to conduct projects generating woody biomass; in fact, two users expressed skepticism that the large amounts of woody biomass expected to result from widespread thinning activities will ever materialize. One official stated, "We keep hearing about this coming 'wall of wood,' but we haven't seen any of it yet." In response

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to these concerns, officials from both the Department of the Interior and the Forest Service told us that their agencies are seeking to increase the availability of woody biomass from federal lands.

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### Users Choosing Woody Biomass over Oil or Natural Gas Made Additional Investments in Equipment and Incurred Additional Operations and Maintenance Costs

Several users in our review told us they incurred costs to purchase and install the equipment necessary to use woody biomass beyond the costs that would have been required for using fuel oil or natural gas. The cost of this equipment varied considerably among users, from about \$385,000 for a school district to \$15 million for a pulp and paper mill. Wood utilization also increased operation and maintenance costs for some users, in some cases because of problems associated with handling wood. During our visit to one facility, wood chips jammed on a conveyor belt, dumping wood chips over the side of the conveyor and requiring a maintenance crew member to clear the blockage manually. At the power plant mixing woody biomass with coal, an official told us that a wood blockage in the feed mechanism led to a fire in a coal-storage unit, requiring the plant to temporarily reduce its output of electricity and pay \$9,000 to rechip its remaining wood.

Other issues specific to individual users also decreased woody biomass use or increased costs for using the material. For example, the Vermont wood-fired power plant is required by the state to obtain 75 percent of its raw material by rail, in order to minimize truck traffic in a populated area. According to plant officials, shipping the material by rail is more expensive than shipping by truck and creates fuel supply problems because the railroad serving the plant is unreliable and inefficient and experiences regular derailments. Another power plant was required to obtain a new emissions permit in order to begin burning wood in its coal-fired system.

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### Current Users' Experiences Offer Insights for Government Efforts to Expand the Use of Woody Biomass

Our findings offer several insights for promoting greater use of woody biomass. First, rather than helping to defray the costs of forest thinning, attempts to encourage the use of woody biomass may instead stimulate the use of other wood materials such as mill residues or commercial logging slash. Second, government activities may be more effective in stimulating woody biomass use if they take into account the extent to which a logging and milling infrastructure to collect and process forest materials is in place. And finally, the type of efforts employed to encourage woody biomass use may need to be tailored to the scale and nature of individual recipients' use.

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## Market Forces May Lead Wood Users to Forgo Small-Diameter Trees in Favor of Alternatives

Unless efforts to stimulate woody biomass utilization are focused on small-diameter trees and other material contributing to the risk of wildland fire, such efforts may simply increase the use of alternative wood materials (such as mill residues) or slash from commercial logging operations. In fact, several users told us that they prefer such materials because they are cheaper or easier to use than woody biomass.

Indeed, an indirect attempt to stimulate woody biomass use by one Montana user in our review led to the increased use of available mill residues instead. The Forest Service provided grant funds to finance the Montana school district's 2003 conversion to a wood heating system in order to stimulate the use of woody biomass in the area. As a condition of the grant, the agency required that at least 50 percent of the district's fuel consist of woody biomass during the initial 2 years of the system's operation. Officials told us that the district complied with the requirement for those 2 years, but for the 2005-2006 school year, the district chose to use less expensive wood residues from a nearby log-home builder.<sup>9</sup>

It should be noted that the use of mill residues is not entirely to the detriment of woody biomass. Using mill residues can facilitate woody biomass utilization by providing a market for the byproducts (such as sawdust) of industries using woody biomass directly; this, in turn, can enhance these users' profitability and thereby improve their ability to continue using the material cost-effectively. In addition, the availability of both mill residues and woody biomass provides diversity of supply, allowing users to continue operations even if one source of supply is interrupted or becomes prohibitively expensive. Nevertheless, these indirect effects, even where present, may be insufficient to substantially influence the use of woody biomass.

Mill residues aside, even those users that consumed material we define as woody biomass often used the tops and limbs from trees harvested for merchantable timber or other uses rather than small-diameter trees contributing to the problem of overstocked forests. Logging slash can be cheaper to obtain than small-diameter trees when it has been removed from the forest by commercial logging projects—which often leave slash piles at roadside “landings,” where trees are delimbed before being loaded onto trucks. Unless woody biomass users specifically need small-diameter

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<sup>9</sup>The district has since obtained about 550 tons of woody biomass (about 75 percent of its annual consumption) from a nearby thinning project.

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logs—for use in sawing lumber, for example—they may find it cheaper to collect slash piled in roadside areas than to enter the forest to cut and remove small-diameter trees.

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### The Effectiveness of Efforts to Encourage Woody Biomass Use May Depend on the Presence of Other Wood-Related Industries

Government activities may be more effective in stimulating woody biomass use if they take into account the extent to which a logging and milling infrastructure is in place in potential users' locations. The availability of an affordable supply of woody biomass depends to a significant degree on the presence of a local logging and milling infrastructure to collect and process forest materials. Without a milling infrastructure, there may be little demand for forest materials, and without a logging infrastructure, there may be no way to obtain them. For example, an official with the Nebraska college in our review told us that the lack of a local logging infrastructure could jeopardize the college's future woody biomass use. The college relied on slash from commercial loggers working nearby, but this official told us that the loggers were based in another state and the timber they were harvesting was hauled to sawmills over 100 miles away. According to the official, if more timber-harvesting projects were offered closer to the sawmills, these loggers would move their operations in order to reduce transportation costs—eliminating the nearby source of woody biomass available to the college.

In contrast, users located near a milling and logging infrastructure are likely to have more readily available sources of woody biomass. One Montana official told us that woody biomass in the form of logging slash is plentiful in the Missoula area, which is home to numerous milling and logging activities, and that about 90 percent of this slash is burned because it has no market. The presence of such an infrastructure, however, may increase the availability of mill residues or other materials, potentially complicating efforts to promote woody biomass use by offering more attractive alternatives.

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## Efforts to Encourage Woody Biomass Use May Be More Effective If They Are Tailored to the Scale and Nature of Recipients' Use

Government activities may be more effective in stimulating woody biomass use if their efforts are tailored to the scale and nature of the users being targeted. Most of the large wood users we reviewed were primarily concerned about supply, and thus might benefit most from federal efforts to provide a predictable and stable supply of woody biomass. Such stability might come, for example, from long-term contracts signed under stewardship contracting authority, which allows contracts of up to 10 years.<sup>10</sup> In fact, one company currently plans to build a \$23 million woody biomass power plant in eastern Arizona, largely in response to a nearby stewardship project that is expected to treat 50,000 to 250,000 acres over 10 years. Similarly, officials of a South Carolina utility told us that the utility was planning to invest several million dollars in equipment that would allow a coal-fired power plant to burn woody biomass from thinning efforts in a nearby national forest. In both cases, the assurance of a long-term supply of woody biomass was a key factor in the companies' willingness to invest in these efforts.

In contrast, small users we reviewed did not express concerns about the availability of supply, in part because their consumption was relatively small. However, three of these users relied on external financing for their up-front costs to convert to woody biomass use. Such users—particularly small, rural school districts or other public facilities that may face difficulties raising the capital to pay needed conversion costs—might benefit most from financial assistance such as grants or loan guarantees to fund their initial conversion efforts. And as we noted in our previous report on woody biomass, several federal agencies, particularly the Forest Service, provide grants for woody biomass use.

However, federal agencies must take care that their efforts to assist users are appropriately aligned with the agencies' own interests and do not create unintended consequences. For example, while individual grant recipients might benefit from using woody biomass—through fuel cost savings, for example—benefits to the government, such as reduced thinning costs, are uncertain. Without such benefits, agency grants may simply increase outlays but not produce comparable savings in thinning costs. The agencies also risk adverse ecological consequences if their efforts to develop markets for woody biomass result in these markets

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<sup>10</sup>Stewardship contracting involves the use of any of several contracting authorities on the part of the Forest Service and Interior's Bureau of Land Management. See GAO, *Federal Land Management: Additional Guidance on Community Involvement Could Enhance Effectiveness of Stewardship Contracting*, [GAO-04-652](#) (Washington, D.C.: June 14, 2004).

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inappropriately influencing land management decisions. As noted in our prior report on woody biomass, agency and nonagency officials cautioned that efforts to supply woody biomass in response to market demand rather than ecological necessity might result in inappropriate or excessive thinning.

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## Concluding Observations

Drawing long-term conclusions from the experiences of users in our review must be done with care because (1) our review represents only a snapshot in time and a small number of woody biomass users and (2) changes in market conditions could have substantial effects on the options available to users and the materials they choose to consume. Even so, the variety of factors influencing woody biomass use among users in our review—including regulatory, geographic, market-based, and other factors—suggests that the federal government may be able to take many different approaches as it seeks to stimulate additional use of the material. Because these approaches have different costs, and likely will provide different returns in terms of defraying thinning expenses, it will be important to identify what kinds of mechanisms are most cost-effective in different circumstances. In doing so, it also will be important for the agencies to take into account the variation in different users' needs and available resources, differences in regional markets and forest types, and the multitude of available alternatives to woody biomass. If federal agencies are to maximize the long-term impact of the millions of dollars being spent to stimulate woody biomass use, they will need to design approaches that take these elements into account rather than using boilerplate solutions.

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Mr. Chairman, this concludes my prepared statement. I would be pleased to answer any questions that you or other Members of the Subcommittee may have at this time.

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## GAO Contact and Staff Acknowledgments

For further information about this testimony, please contact me at (202) 512-3841 or [nazzaror@gao.gov](mailto:nazzaror@gao.gov). David P. Bixler, Lee Carroll, Steve Gaty, and Richard Johnson made key contributions to this statement.

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