

WBUG Accomplishments Report

2006-2011

Woody Biomass Utilization Group

August 10, 2012

The Woody Biomass Utilization Group (WBUG) is an interagency working group (IWG) of federal agencies. WBUG was chartered in 2006 to promote the sustainable utilization of forest biomass. It is an IWG of the Biomass Board. Over the past five years, the Working Group has undertaken many activities and special projects in support of this mission. This report provides information about WBUG, including a summary of activities and descriptions of major accomplishments.

Disclaimer: This report is the product of the members of the Woody Biomass Utilization Group and provides information about the Working Group. The report does not constitute or imply any policy of the departments and agencies represented. Neither is the report an official government report of the activities of the Woody Biomass Utilization Group.

Executive Summary

The Woody Biomass Utilization Group (WBUG) is a federal working group. The purpose of WBUG is to promote and support the utilization of woody biomass and woody biomass products and residues from forest and woodland health, management, and restoration treatments wherever environmentally, economically, and legally appropriate. Membership has been primarily participants from the Department of Agriculture (USDA), Department of Energy (DOE), Department of the Interior (DOI), and the Environmental Protection Agency (EPA). WBUG's foundation is in the implementation of a 2003 joint USDA/DOI/DOE Departmental Memorandum of Understanding (MOU) to encourage the use of woody biomass utilization. In 2006, the Biomass R&D Board formally chartered WBUG.

WBUG has open membership to federal government employees with an interest in biomass utilization. The group also works with non-federal partners such as academia, industry, state and local governments, professional associations, environmental groups, and other non-governmental organizations. Leadership rotates annually among DOE, DOI, and USDA. The department representatives jointly establish an annual Plan-of-Work, which is accomplished by volunteers taking on various tasks in the work plan. The departments do not fund WBUG activities, except through the collateral duties of the members.

Coordination has been very successful through the formal and informal exchange of information, regular meetings and phone conferences, presentations, agency updates, events, and projects. The annual work plans of ongoing and special projects, activities, and actions have been the primary manner of implementing the MOU.

This report provides a summary of 12 projects as examples of the working group's accomplishments during 2006–2012. There are three comprehensive guides: (1) preparing federal biomass sales, (2) establishing a “feedstock yard,” and (3) recovering biomass from wind disturbances. An example of collaboration with external partners is the publishing of a national biomass roadmap. One project includes assessing federal “offerings of biomass for purchase” and another is the *Billion-Ton Update*. Ongoing Forest Service projects with some WBUG involvement are the annual woody biomass utilization grants, periodic publishing of success stories, and wide array of research. Summaries are included for efforts on air quality compliance and education and training.

WBUG has made significant progress in supporting the utilization of biomass over the past 5 years. There are still challenges and barriers ahead for biomass utilization that are best addressed through the coordination and collaboration of federal agencies with similar missions. The group has the potential to accomplish much more through the formal coordination of an interagency working group.

Introduction

Woody Biomass Utilization Group (WBUG) is often referred to as “Woody BUG.” It is a federal working group. The purpose of WBUG is to promote and support the utilization of woody biomass and woody biomass products and residues from forest and woodland health, management, and restoration treatments wherever environmentally, economically, and legally appropriate. In accomplishing this goal as a working group, there are mutual benefits to the participating agencies, i.e. furthering individual agency missions and goals in woody biomass utilization. Membership has been primarily from the the U.S. Department of Agriculture (USDA), U.S. Department of Energy (DOE), U.S. Department of the Interior (DOI), and the Environmental Protection Agency (EPA).

Interest in biofuels, biopower, and bioproducts has grown significantly over the past decade, as concerns over energy security, the economy, and environmental quality have become more prevalent. As each of the different agencies in WBUG worked on the barriers to commercializing biomass for energy feedstocks, it became apparent that improved coordination was needed to provide the many advantages of collaboration.

The working group was formally chartered in 2006. Since that time, WBUG has produced significant results. This report provides some background information about WBUG and describes accomplishments. for the years 2006–2011.

Acknowledgements

Many people have been involved in the Woody Biomass Utilization Group over the past several years. Their many contributions, both individually and collectively, have resulted in significant outcomes and accomplishments. The Working Group is especially grateful to its members who contributed to this report.

History of WBUG

The creation of WBUG occurred over more than a five-year period. There were several significant events along the pathway to the inception of the working group.

The *National Energy Policy*, published in May 2001, recommended that the secretaries of the Department of the Interior and Energy re-evaluate access limitations to federal lands to increase renewable energy production, such as biomass, wind, geothermal, and solar. These secretaries held such a conference in November 2001. A second renewables conference was held in February 2002. Many of the recommendations from these conferences were included in an interagency report¹ in August 2002 prepared jointly by the DOI and DOE aimed at increasing renewable energy production on federal lands.

In June of 2003, a Memorandum of Understanding² (MOU) on *Policy Principles for Woody Biomass Utilization for Restoration and Fuel Treatments on Forests, Woodlands, and*

¹ <http://www.fws.gov/habitatconservation/Renewable%20Energy%20Report.pdf>

² http://www.forestsandrangelands.gov/Woody_Biomass/documents/biomass_mou_060303_final_web.pdf

Rangelands was signed by the secretaries of Agriculture, Energy, and Interior. During the development of the MOU, various representatives of these departments worked together, forming an initial core of interested staff working on biomass utilization. Furthermore, the MOU provided cause and direction for the departments to work together on the topic.

USDA and DOI were also implementing policy actions to address the risk of catastrophic wildfire and improve forest and rangeland health on federal lands by thinning biomass to reduce its density. DOE had an interest in the utilization of woody biomass for bioenergy. The three departments, in coordination with the Western Governors Association, held a Bioenergy and Wood Products Conference January 20–22, 2004, in Denver, Colorado, to discuss opportunities for biomass utilization. At the conference, an executive with DOI formally announced the intent to form an interagency working group.

After Hurricane Katrina struck the Gulf Coast in August 2005, federal agency representatives were involved in a planning meeting at the request of the state of Mississippi to help address the utilization of damaged trees and downed debris. This was a forerunner activity of WBUG, as many of the participants became members of the working group.

At a meeting in Charlottesville, Virginia, in January 2006, members of the working group and other interested parties developed a collective vision statement and began a process to formalize the group. In August 2006, a charter³ for WBUG was signed to establish the interagency working group of the Biomass Research and Development (R&D) Board.

WBUG Vision, Goals, and Organization

WBUG is grounded in the original 2003 joint departmental MOU to encourage the use of woody biomass from forest and rangeland restorations as well as hazardous fuels treatments, in lieu of open burning of piles or other disposal methods. The established eight policy principles have provided guidance for WBUG activities since its inception. A focus of the working group has been on the implementation of the MOU. Over the past 10 years, there have been numerous laws, policies, and initiatives in place to provide direction. The vision of the group is: “ecologically and economically sustainable woody biomass utilization will result in more diverse forest, woodland, and rangeland ecosystems—characterized by native flora and fauna, healthy watersheds, better air quality, improved scenic qualities, resilience to natural disturbances, reduced wildfire threats to communities, and provide an alternative waste management strategy, contributing to rural economic vitality and national energy security.”

As listed in the charter, the specific objectives of WBUG are summarized below:

- Coordinate, plan, enable, and encourage utilization of woody biomass through statutory and regulatory authorized activities
- Implement the Policy Principles of the Woody Biomass MOU
- Serve as technical and policy advisors on woody biomass utilization
- Function as an information-clearing house

³ http://www.forestsandrangelands.gov/Woody_Biomass/documents/wbug_charter_final_08_28_2006.pdf

- Develop liaisons and enhance collaboration with external organizations and partners.

WBUG has open membership to anyone in the federal government with an interest in biomass utilization. Over the past 5 years, membership has been very dynamic as individuals move through different positions or assignments in the agencies. Also, although a federal working group, WBUG has worked very well with non-federal partners such as academic, industry, state and local governments, professional associations, environmental groups, and other non-government organizations.

The operation of the working group has been very simple. Leadership has rotated annually through the major departments, DOE, DOI, and USDA. An annual Plan-of-Work is jointly established by the department representatives and assignments are undertaken by volunteers to accomplish tasks in the work plan. The Departments do not fund WBUG activities, except as a collateral duty of the members.

Finally, there has been an ongoing effort to enhance the function of the working group by interacting with outside organizations and partners. Non-federal guests presented topics of interest to inform the group. Periodically, WBUG hosts a Partners Meeting in which outside organizations are invited to make presentations about ongoing concerns and issues while the agencies provide and update of activities.

Accomplishments

WBUG has made significant progress over the past 5 years in coordination activities to progress toward the defined goals and to meeting specific project accomplishments. Some of the accomplishments are in response to ongoing, routine needs associated with the goals or were completed in response to a special need or assignment.

Coordination has been very successful through formal and informal information exchange, regular meetings with agenda discussion points, member and guest presentations, agency updates on activities and events, regular and special-topic phone conferences, standing and ad hoc task subgroups, and an annual Plan-of-Work. This combination of activities and operating procedures contributed to improved coordination through several levels— from personal communications to more formal departmental coordination.

Implementing the Policy Principles of the MOU has been addressed primarily through annual work plans with ongoing and special projects, activities, and actions. These efforts have been responsive to identified needs. The working group annual Plan-of-Work and the website have been significant tools in implementing the MOU. More detailed information on the accomplishments follow.

A cadre of informed, capable biomass specialists is and has been involved with the working group over the years. The process of having different people rotate through WBUG and work on various assignments has contributed to the collective knowledge and broader agency

representation for the working group. Over time, this cadre has been able to provide individual and corporate technical and policy advice to the agencies.

The WBUG accomplishments can be summarized as coordination activities, project actions, and information transfer functions. Collectively, these activities, actions, and functions have contributed to meeting the working group goals and implementing the MOU. For the purpose of this report, only the project actions will be presented. These selected actions demonstrate many of the projects completed.

The coordination and the information exchange and transfer activities have been discussed previously. Establishing a formal working group with a roster and distribution list, regular meetings, rotating leadership, and collaborating on planned actions contributed greatly to the WBUG success. In addition, the website and the sharing of products generated from project actions, contributed significantly to information transfer. In addition, having guest speakers, hosting partners meetings, attending, presenting, providing a display/booth at different conferences, and working with outside groups contributed to information exchange and transfer. The most significant information transfer function has been through the WBUG website, http://www.forestsandrangelands.gov/Woody_Biomass/overview.shtml. The website has information about WBUG, technical and policy aspects of biomass utilization, and tools to assist managers, producers, and users.

Examples of Project Actions

1. Woody Biomass Utilization Desk Guide

A significant barrier to implementing the departmental MOU to encourage the use of woody biomass from forest and rangeland restorations and hazardous fuels treatments was the lack of information and tools for federal managers to help with timber sale planning and preparation involving small-diameter tree and biomass utilization. A desk guide was conceived by WBUG. Members contributed ideas, discussed content, and provided guidance during the development, review, and implementation. The Forest Service took the lead to develop one that explicitly conformed to their regulations and processes.

The goal of the desk guide is to help federal land managers either start or build upon existing regional, forest, district, and other field offices and community-level small-diameter tree and biomass-utilization programs. The purpose of the desk guide is to:

- Provide a quick reference guide and suggestions to local land managers on how to locate and collaborate with biomass stakeholders
- Assess the viability of offsetting the costs of accomplishing hazardous fuels and ecosystem restoration treatments by utilizing marketable small-diameter trees and other biomass.

A report, *Woody Biomass Utilization Desk Guide*, was completed in 2007. The report covers all aspects of a biomass project, from design to sale preparation. The report provides technical information on harvesting and transport systems, sale preparation, NEPA, and contracts.

The report is available at

http://www.forestsandrangelands.gov/Woody_Biomass/documents/biomass_deskguide.pdf

2. Woody Biomass Feedstock Yard Business Development Guide

Difficulties in establishing a consistent and reliable supply of biomass feedstocks is an obstacle to woody bioenergy and bioproducts development and commercialization. No comprehensive source of information, examples, and resources existed, so a guide was developed for business developers and producers.

The guide provides an overview of the challenges and opportunities to establish a woody biomass feedstock yard in the United States. It includes information on: (1) biomass sourcing, (2) facility site selection and equipment, (3) biomass sort yards, (4) biomass collection, concentration, and distribution, (5) biomass handling, sorting, and economic considerations, (6) business planning, (7) marketing and distribution,(8) financial feasibility analysis, and (9) sources of technical assistance and funding. Additional references and resources are included.

A woody biomass “feedstock yard” is a collection point or location for collecting and concentrating biomass from various sources. Biomass is collected, sorted, consolidated, processed and distributed to a variety of markets and uses. It provides an alternative in the biomass supply chain that could have benefits over traditional woods-to-processor delivery scenarios.

The guide has been designed for those interested in developing a business to supply woody biomass for forest products, wood energy and other uses. The guide provides information about the development, operation, and management of a woody biomass feedstock yard. For example, a woody biomass feedstock yard could be developed to help solve a disposal problem, recover and utilize a natural resource, contribute to the local economy and the environment, or as a way to be a better steward for taxpayers.

A woody biomass feedstock yard could help guide a “woods wise” person to own and operate a small business enterprise. Woody biomass is an abundant and renewable feedstock for energy and other uses and may present an opportunity for those willing to make investments. The guide provides information and guidance on the establishment of a business and ways to improve the operation of an existing business.

Investors looking at renewable energy may see opportunities for tapping into the potential of woody biomass, but may be uncertain how to make the connection between the available biomass resource and opportunities associated with emerging biofuels and bioenergy markets. The guide helps provide a way to make that connection to the biomass supply chain and to evaluate woody biomass opportunities.

The guide is only one of several resources— just one instrument in the creation of a new business in the area of renewable energy. All those contemplating the development of a biomass feedstock yard should carefully study the guide and consider the resources available in evaluating opportunities. Success is based on objective business planning approach to business

development as described therein. As always, individual and collective creativity, resourcefulness, and flexibility will also help determine any resulting success.

The guide is available at

http://www.forestsandrangelands.gov/Woody_Biomass/documents/feedstock_yard_guide.pdf.

3. CROP

The Coordinated Resource Offering Protocol (CROP) interactive website (<http://www.crop-usa.com/>) is now available to contractors, investors, and the general public to quickly access continually updated woody biomass supply offerings expected to be generated from public forest lands within defined landscapes over an on-going five-year period. The interactive website allows the user to quickly access supply offerings from a variety of different search options (by agency, diameter size, specie, volume, year, location, project name, NEPA phase, road conditions, or any combination of search options). CROP users are able to see quickly expected supply variations in offerings between field-level agencies (ranger districts, field offices, supervisory areas etc.). Information on live or dead-tree supply offerings is immediately available, and the CROP Interactive Haul Distance feature allows fast access to recalculated supply volumes, supply characteristics, and resource supplier agencies within road distance selections. Mini-CROPs based on any combination of search options within haul distances are also immediately available to the user.

Currently, CROP results for all of Utah and sections of Colorado, Idaho, Mississippi, Missouri, Montana, New Mexico, Oregon, South Carolina, and Washington are available on the CROP interactive website. Prior CROP results for sections of the New England States, Oregon, Southeast Alaska, Northern California, and Wyoming are on another website (http://www.forestsandrangelands.gov/Woody_Biomass/supply/CROP/index.shtml#priorcrop), but are being transitioned to the interactive website.

The CROP studies are one way to reduce inconsistencies in offerings of biomass removed from federal lands as it reduces risks to bidders, purchasers, and contractors. CROP provides information about potential timber and biomass sales into the future. This provides an incentive to utilize woody biomass for bioenergy and bioproducts.

4. Timber Recovery and Wood Utilization from Wind Disturbances

In the event of a natural disaster, damaged timber and woody debris pose many challenges for their communities and regions. Residential debris management and disposition generally constitute the largest single public cost after a disaster, often in the billions of dollars. The rapidity (and hence the effectiveness) of emergency response to a disaster usually depends on how quickly debris (initially, mainly woody debris – downed trees, shrubs, and other vegetation) can be removed from roads and highways. Woody debris is a major—and sometimes the dominant—component of the debris generated by a disaster in residential areas, taxing the capacities of local disposal facilities. The rapidity (and hence the effectiveness) of forest restoration (reforestation, watershed improvement, insect/disease suppression) and forest industry economic recovery from a disaster also usually depends on how quickly woody debris and damaged timber can be removed.

However, these challenges can be met if the forest enterprise— forest owners; the forest products industries; state, local and federal government— prepares for the next disaster by learning from the failures and successes of previous disasters. WBUG initiated an effort to identify methods to meet these challenges by holding a workshop in April 2008. An Action Plan resulted from that effort, intended to help each of the stakeholders in the disaster response community and the forest enterprise meet the challenges of damaged timber and woody debris by incorporating the lessons from the past into their preparations for future disasters.

Specific recommendations are discussed in detail in the plan. The Action Plan also identifies information and research needs that, if filled, would enhance the resilience of the forest enterprise.

The information is available at the following websites:

http://www.forestsandrangelands.gov/Woody_Biomass/news_events/recovery_utilization_workshop_031908.shtml

http://www.windwoodutilization.org/pdf/action_plan.pdf

http://www.windwoodutilization.org/http://www.windwoodutilization.org/pdf/action_plan.pdf

5. A National Wood-to-Energy Roadmap

The use of biomass for energy, particular woody biomass, has captured national attention with much discussion, if not debate, on the proper role of forests in a renewable energy future. Woody biomass can provide energy security, reduced greenhouse gases, and economic opportunity if developed in a sustainable manner that continues to support current infrastructure and conserves our natural resources. Policies are needed that embrace a balanced approach to woody biomass for energy development that balances the diverse viewpoints. *A National Wood-to-Energy Roadmap* provides such recommendations based on thoughtful deliberations from representatives from a wide range of resource organizations and the federal government.

WBUG initiated the project and collaborated very closely with 25x'25, a national alliance that promotes renewable energy, and a 21-person working group of representatives from landowner groups, professional forestry organizations, environmental organizations, traditional forest industries, emerging renewable energy industries, and academia to develop the report. Experts from federal agencies, universities, conservation groups, industry, and other organizations contributed comprehensive presentations on the selected topics. This information was used to develop the recommendations.

The report, *A National Wood-to-Energy Roadmap*, was published in June 2011. It represented a two-year process during which experts provide detailed information in public forums on the future of biomass energy: wood demand and supply; sustainability, carbon and climate change; and, energy policies. A consensus set of recommendations were developed to help establish the policies that encourage investments in woody biomass energy from forests and wood wastes. Recommendations were developed within the framework of meeting the future demands for both energy and traditional products while simultaneously supporting wildlife, clean water, clean air, recreation, and our national heritage.

The report is available at
http://www.25x25.org/index.php?option=com_content&task=view&id=711&Itemid=256.

6. Woody Biomass Utilization Grants

The Woody Biomass Utilization Grant Program is focused on creating markets for small-diameter material and low-valued trees removed from forest restoration activities. Examples to improve the health of forest and protected communities include reducing hazardous fuels, handling insect and disease conditions, or treating forestlands impacted by catastrophic weather events. These funds are targeted to help communities, entrepreneurs, and others turn forest residues into marketable forest products, including renewable energy. Grants have ranged in size from \$50,000 to \$350,000 and can be in place for up to 3 years. A minimum non-federal match of 20% is required from the grantee. For fiscal years 2011 and 2012 there was a shift of focus to wood energy as part of the USDA “Wood to Energy” Initiative. The grants focus is now on the design and other pre-construction information so that projects can compete more effectively for funding from USDA and banks. The intent is to create more synergy between the various USDA programs.

Over the past 7 years, requests have totaled \$175 million in federal funds. The Forest Service provided \$35 million towards 154 projects ranging from harvesting equipment to facilitate removals, to engineering design for bioenergy facilities. For example, the F.H. Stolze Land and Lumber Company’s sawmill in Columbia Falls, Montana is putting in a 2.5 megawatt boiler for electricity and heat. In New York, a community is designing their community center and pool to be heated with woody biomass. Both of these projects are over \$5 million and would not have been able to proceed without the engineering analysis and cost estimation. The Program has proven that it can leverage much larger funding working through others, while expanding the regional role in providing the dollars badly needed for direct technical assistance on local projects.

More information is available at www.fpl.fs.fed.us/tmu.

7. Success Stories

The Technology Marketing Unit at the Forest Products Laboratory has been very instrumental in promoting the use of small-diameter trees and forest biomass for bioenergy and bioproducts. They have documented and shared “success stories” as a primary way of providing information and assistance to interested persons. Originally these success stories were summarized and reported in published documents. Currently they are located online at http://www.forestsandrangelands.gov/Woody_Biomass/success/index.shtml. A search tool can be used to find project write-ups by year, state, and agency. Each topic has great background information, pictures, and other resources.

8. Forest Service R&D

Forest Service R&D provides the science and new technology for the management and utilization of America’s forests and grasslands. The research ranges from the molecular to landscape over various time frames including long-term studies. Biomass management and utilization research is only a small part of the formal program, but much of the other ancillary research supports biomass development as basic research promotes applied research and

deployment of new knowledge and technologies. This includes various topics and disciplines such as genetics, silviculture, remote sensing and inventory methods, nutrient and water management, harvesting systems, new product development, conversion technologies, life-cycle analysis, marketing and economics, and sustainability.

Research is conducted at regional research stations and the Forest Products Laboratory. The Forest Service, in partnership with the Agriculture Research Service, has Regional Biomass Research Centers⁴ to help ensure that dependable supplies of needed feedstocks are available for the production of advanced biofuels to meet legislated goals and market demand and to enable as many rural areas across the country as possible to participate and benefit economically. More information about the program can be found at <http://www.fs.fed.us/research/biomass-bioenergy/>.

Some examples of research and technology development over the past 5 years include:

- **Evaluation and Successful Deployment of Forest Biomass Bundling Technology:** The USDA Forest Service conducted an evaluation of biomass bundling for forest residue extraction. A CD is available that provides a report of the project results, a video documentary project record, and a collection of images from the project: <http://www.srs.fs.usda.gov/forestops/biomass.html>
- **BioSAT:** USDA has partnered with the SE Sun Grant to develop BioSAT, a siting model for biorefineries that combines agricultural and forest feedstock supply with logistics models to estimate cost-curves: www.BioSAT.net
- **Forest Residue Trucking Simulator (version 5):** The Forest Residues Transportation Model is a spreadsheet calculator designed to help compare alternative methods of moving biomass from the forest to a wood-using facility. Using default values or specific input, it will estimate loading and hauling costs for different combinations of equipment, evaluate the best mix (numbers and types) of equipment, compare different hauling routes, examine reloading, or two-stage hauling opportunities. It is intended to represent a relative comparison among options: <http://www.srs.fs.usda.gov/forestops/biomass.html>
- **U.S. Billion-Ton Update:** Forest Service researchers helped complete the comprehensive biomass resource assessment. The *U.S. Billion-Ton Update* report was released by DOE in August 2011, representing the efforts of 50 contributors, and includes cost estimates on a county level for key biomass feedstocks: <https://bioenergykdf.net/content/billiontonupdate>
- **Review of State of Knowledge on Water Quality and Bioenergy Production:** The Forest Service collaborated in an international review of the impact of biomass production, conversion, and use on water quality. The review focuses on characterizing and quantifying the effects of bioenergy on water quality and on options for reducing negative impacts: http://www.fs.fed.us/rm/pubs_other/rnrs_2011_diaz_chavez_r001.pdf
- **Managing Loblolly Pine for Energy and Wood Products:** Southern pine stands have the potential to provide significant feedstocks for emerging biomass energy and biofuel markets. Dual cropping of pine seeded between rows in pine plantations appears to be a viable method to produce both bioenergy and solid-wood products: <http://www.treesearch.fs.fed.us/pubs/31523>

⁴ <http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2010/10/0546.xml>

- **Geospatially explicit tools for maintaining soil productivity in western United States forests:** Based upon the most current forest harvesting research, on harvest activities that decrease, maintain, or increase soil-site productivity was compiled. Digital soil and geology databases were used to construct geospatially explicit best management practices to maintain or enhance soil-site productivity. The proposed risk assessments could aid in identifying resilient soils for forestland managers considering biomass operations, policy makers contemplating expansion of biomass harvesting and investors deliberating where to locate bioenergy conversion facilities: <http://www.treesearch.fs.fed.us/pubs/39136>
- **Maintaining soil productivity during forest or biomass-to-energy thinning harvests in the western United States:** Forest biomass thinnings, to promote forest health or for energy production, can potentially impact the soil resource by altering soil physical, chemical, and/or biological properties. Basic recommendations and findings derived from stand-removal studies are also applicable to guide biomass thinnings for forest health, fuel reduction, or energy production: <http://www.treesearch.fs.fed.us/pubs/34428>
- **Woody biomass from short rotation energy crops:** Short-rotation woody crops are ideal for woody biomass production and management systems because they are renewable energy feedstocks for biofuels, bioenergy, and bioproducts that can be strategically placed in the landscape to conserve soil and water, recycle nutrients, and sequester carbon. Overall, sustainable production of fuels, chemicals, and fibers from woody biomass depends on a combination of feedstocks from both forests and plantations: <http://www.treesearch.fs.fed.us/pubs/38715>
- **Biomass and genotype × environment interactions of *Populus* energy crops in the Midwestern United States:** A regional network of *Populus* field tests was established in the Midwest in 1995, 1997, and 2000 to assess relative productivity of 187 clones grown at Westport, Minnesota; Waseca, Minnesota (only 2000); Arlington, Wisconsin; and Ames, Iowa. Biomass potential was evaluated throughout plantation development and clones with yield substantially greater than commercial controls were identified. <http://treesearch.fs.fed.us/pubs/19917>

9. Woody Biomass Combustion and Air Quality

Wood has been and still is a significant source of energy for residential heating. More recently, there is interest in using woody biomass to heat, cool, and power schools, hospitals, the light industry, and other single-project applications. Wood is used in larger industrial applications and commercial power generation. Health studies have linked exposure to fine particle pollution to a wide range of heart and lung health effects affecting older people, children, and those with pre-existing heart or lung disease. The use of biomass in combustion, from the residential to the industrial application, can contribute to fine particle and toxic emissions unless improved combustion or control technologies are used.

WBUG undertook actions to provide the most up-to-date information on federal pollution regulations for smaller/institutionalized boilers and air pollution-control technologies. A summary of the technology was developed in collaboration with EPA and other organizations. Information was posted on the WBUG website.

More information is available at
http://www.forestsandrangelands.gov/Woody_Biomass/documents/bioenergy/woody_biomass_control_technology_032509.pdf.

10. Billion-Ton Update

The “*U.S. Billion-Ton Update–Biomass Supply for a Bioenergy and Bioproducts Industry*” was published by DOE in 2011. The report is an update to the original 2005 biomass assessment that concluded that about one billion dry tons of biomass was sustainably available in the United States, annually. The report was prepared by the DOE Biomass Program and the Oak Ridge National Laboratory, with contributors from USDA and several universities. The *Billion-Ton Update* is a more rigorous analysis of biomass availability in the contiguous United States using cost supply curves at the county level for the major types of feedstocks. The study also modeled sustainability and land-use change. Several scenarios were analyzed using different yield rates for energy crops. Knowing the current and future potential availability of biomass on more refined temporal and spatial scales is important to reduce investment risk and provide opportunity for commercialization. The assessment provides a comprehensive analysis with a given set of transparent assumptions and available data that has utility for researchers, producers, analysts, and business leaders.

The report is available at <https://bioenergykdf.net/content/billontonupdate>.

11. Renewable Energy Feasibility Studies

Beginning in FY 2009, WBUG began to explore the possibilities for piloting federal biomass energy facilities. The Forest Service, DOI, and DOE Federal Energy Management Program (FEMP) formed a feasibility team to develop, analyze, and pilot federal biomass energy facilities. Nationally, 112 projects were submitted. Only 48 bioenergy projects were selected as the best to succeed. FEMP agreed to fund the feasibility team efforts while the FS, Bureau of Land Management and Bureau of Indian Affairs provided potential project proposals and technical expertise. This effort was supported and initiated by the Chief of the Forest Service through a letter addressed to Regional Foresters addressing the concept, roadmap, and approximate timeline.

The entire process was a two-year endeavor beginning with executive-level briefings and then field-level awareness briefings. The project was never fully funded. The feasibility studies were completed, but the Forest Service did not complete any pilot facilities. However, the Bureau of Land Management in Oregon is currently moving forward with their bioenergy facility projects.

12. Wood Energy Community of Practice

The “*Wood Energy*” *Community of Practice* (COP) is an online educational resource that is sponsored by USDA NIFA, eXtension Foundation, and the Land-grant Universities. The COP, based at the University of Georgia, provides information to landowners and interested stakeholders regarding the use of woody biomass for the production of energy, fuels, and biobased products. The COP consists of articles and outreach materials that focus on the entire supply chain from wood availability through logistics and impacts of federal and state policies. The COP also provides “Case Studies” for communities interested in recruiting or investing in

wood energy projects, as well as an “Ask the Expert” feature that provides direct feedback from specialists at universities or federal research scientists.

More information is available at http://www.extension.org/wood_energy.

Looking to the Future

Although the working group is chartered under the Biomass R&D Board and has its beginning through an interagency MOU, the future of WBUG remains within the authorization of program work involving woody biomass RDD&D within the individual agencies. As long as there are ongoing activities involving the development, management, harvest, and conversion of woody biomass at several agencies, there will be a need for coordination and collaboration among those agencies. WBUG has fulfilled this function and is expected to continue in a similar capacity.

The last 5 years of cooperation as a formal interagency working group has provided some valuable outcomes and products as demonstrated in this report. Just as the activities and special projects changed over that time in response to the issues, the future certainly holds new challenges for the utilization of woody biomass for bioenergy and bioproducts. This is already evident in the changing programmatic work in the various agencies and with the concerns and interests of the individuals currently involved with WBUG. These past achievements and progress provide the foundation, but not the solutions. More work is still needed.