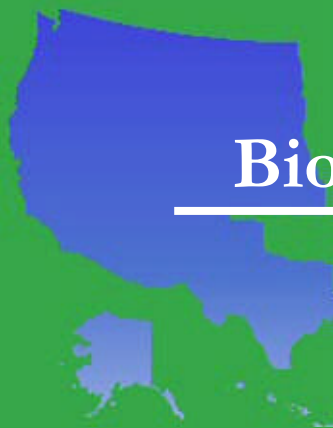


Clean and Diversified Energy Initiative



WESTERN GOVERNORS' ASSOCIATION



Biomass Task Force Report

Executive Summary
January 2006

Western Governors' Association Clean and Diversified Energy Initiative

Biomass Task Force Report

Executive Summary

The Western Governors' Association's Clean and Diversified Energy Advisory Committee (CDEAC) commissioned this task force report in February 2005. Members of the Task Force are listed below. This is one of several task force reports presented to the CDEAC on December 8, 2005 and accepted for further consideration as the CDEAC develops recommendations for the Governors. While this task force report represents the consensus views of the members, it does not represent the adopted policy of WGA or the CDEAC. At their Annual Meeting in June, 2006, Western Governors will consider and adopt a broad range of recommendations for increasing the development of clean and diverse energy, improving the efficient use of energy and ensuring adequate transmission. The CDEAC commends the Task Force for its thorough analysis and thoughtful recommendations.

Members of the Biomass Task Force

Ed Gray (Co-chair)	Antares Group Inc.
David Hallberg (Co-chair)	E3 Bio Fuels LLC (CDEAC member)
Gayle Gordon	National Biomass State & Regional Partnership
Butch Blazer/Kim Kostelnik	New Mexico Forestry Division
Drew Bolin/Olga Erlich	CO Governor's Office of Energy Management and Conservation
Bill Carlson	USA Biomass Power Producers Alliance
Craig Cox	Western Business Coalition for New Energy Technologies
Rob Davis	Future Forests LLC
Scott Haase	McNeil Technologies
Dick Hayslip/Jerald Hunter	Salt River Project
Ward Huffman	U.S. Department of Energy
Bryan Jenkins	UC Davis / CA Biomass Collaborative
Jay Jensen	Western Forestry Leadership Coalition
Jim Kerstetter	NM Governor Clean Energy Dev. Council - Biomass Task Force
Ken Krich	California Institute for Energy and Environment
Ravi Malhotra	International Center for Appropriate and Sustainable Technology
Tad Mason	TSS Consultants
Gregg Morris	Green Power Institute
Richard Nelson	Kansas State University
Ralph Overend	National Renewable Energy Lab
Marcia Patton-Mallory	United States Department of Agriculture Forest Service

Marc Rappaport
Phil Reese
John Stewart
Scott Q. Turn
Chris Wentz
Ed Wheelless

Oregon State Senator Vicki Walker
California Biomass Energy Alliance / Colmac Energy
U.S. Department of the Interior
Hawaii Natural Energy Institute University of Hawaii
NM Energy Conservation & Mgmt Division
Sanitation District of Los Angeles County

Facilitator

Will Singleton

The Keystone Center

Quantitative Working Group

The quantitative working group was created by the CDEAC to compare the analysis of data among task forces in order to ensure consistency in assumptions across the reports.

The following members contributed to this report:

Doug Arent
John Tschirhart
Dick Watson

National Renewable Energy Laboratory
Department of Economics, University of Wyoming
Quantitative Working Group

Biomass as an energy resource has the potential to supply 15,000 MW of electricity to the Western states by the year 2015. At a production cost of 8 cents per kWh, 10,000 MW could be provided. Biomass can supply a constant, distributed, and economic energy supply that is renewable, and that provides important and unique ancillary environmental benefits while the resource is being utilized productively. Examples of these benefits include reduced risks of destructive wildfires, reduced consumption of landfill capacity, and air quality benefits due to reductions in open burning of agricultural and forest residues. In addition, the use of biomass as an energy resource actually reduces greenhouse gas emissions associated with the other dispositions of the material, and contributes to improved public health and stable rural economies. This report's analysis shows that governors can have a tremendous positive impact on the region's energy supply, transmission capacity, and economic health by implementing a few realistic policy recommendations.

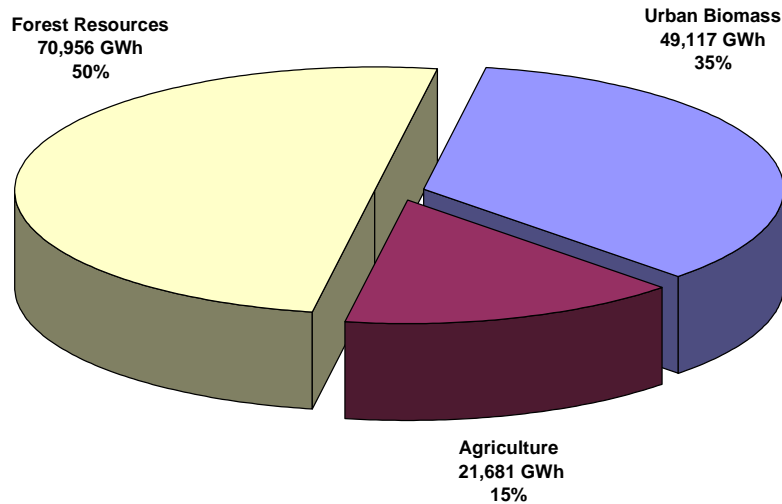
By providing a productive use for biomass residues that have no higher valued use, biomass energy production promotes environmental improvement, provides valuable rural employment and economic development opportunities, and contributes to creating healthier and more fire resilient forests. Biomass energy production makes substantial contributions to reducing greenhouse gas emissions by shifting the proportion of carbon emissions associated with biomass cycling away from more climate active forms, and by protecting forest biomass from destructive wildfires. The 10,000 MW biomass estimate by 2015 would provide for the diversion of roughly 72 million bdt per year of residues from landfill burial, open burning, and accumulation as forest overgrowth. These uncompensated benefits are worth more than \$ 8 billion annually (base on 11 ¢ / kWh).

Supported analysis in this paper shows that substantial electrical power can be produced for the prescribed cost by the year 2015. Analysis also shows that if benefits are taken into account, the costs of using biomass energy (as opposed to fossil fuels) can be a *net positive*. While it is unlikely that all of those benefits can be fully compensated in abating the cost of biomass energy, this report's recommendations aim to turn those benefits into economic incentives enabling substantial amounts of increased biomass energy production to be introduced into the marketplace. These incentives will be very small when compared to the value of the ancillary societal benefits (> 11 ¢ / kWh).

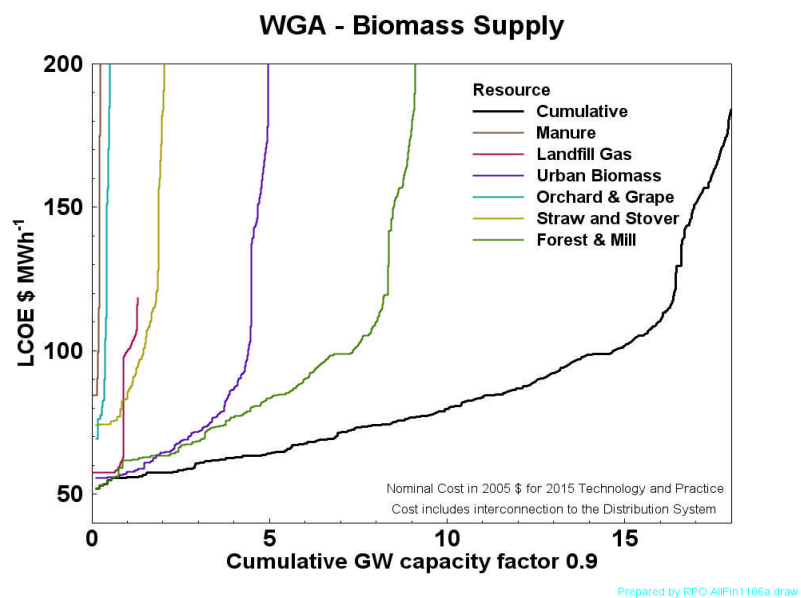
Biomass Supply

The analysis performed on behalf of the Task Force suggests that the potential supply of feedstocks can produce 15,000 MW of generating capacity, or half of the CDEAC target. Biomass feedstocks are extremely diverse. Technologies to utilize the different kinds of biomass fuels are also diverse. Feedstocks include forest resources, agricultural residues and products, and resources from the municipal waste stream including solid wastes, biosolids, sewage, and waste buried in landfills. Biomass is also an important energy source because it is distributed, easing transmission capacity stresses by promoting the production of power close to where it is used.

**Figure 1: Biomass (GWh/y equivalent) in the WGA Region Available for Power Generation
(Applying the conversion efficiencies suited to each component of the resource).**



The Biomass Task Force has done extensive analysis of supply at the production cost of 8 cents / kWh. Our analysis, using the methodology put forward by the WGA Quantitative work group is that 10,000 MW of produced electricity would be available by 2015 at that price. The report highlights a number of different alternate case scenarios that can increase the understanding of the variables that contribute to overall production capacity predictions.



Due to the dispersed nature of biomass resources, there is no need to consider building major new transmission projects to open up resource-rich regions. Other renewable resources typically need major new transmission lines in order to open up areas of resource concentration that are remote from existing lines. Many rural biomass generators provide important voltage support services to the grid, while others may require transmission upgrades to accommodate their deliveries. But biomass facilities by their nature are dispersed, and can be located carefully with respect to the existing grid, rather requiring building out the grid to come to them.

Benefits

Biomass offers important benefits that stem directly from the use of biomass as fuel and thus productively utilizing materials that would otherwise be discarded. By providing a productive use benefit for biomass residues, biomass energy production promotes environmental improvement, provides rural employment and economic growth, and contributes to addressing the threat of forest fires in the Western forests. Biomass energy can also substantially reduce greenhouse gas emissions by shifting emissions from very climate active hydrocarbons such as methane to carbon dioxide, and by protecting forests from destructive wildfires and thus maintaining their ability to sequester carbon.

As the vast forests of the Western United States have become overgrown over the past century, dramatic wildfires have become more common, putting vital habitats, watersheds, and communities at risk. The biomass energy industry offers a low-environmental impact, productive use for dead wood that would otherwise require open burning or – more likely – serve as fuel for a future wildfire. Use of woody biomass for energy production provides an important economic incentive for fuel treatment.

This report features a methodology that a major national study used to demonstrate the net benefits of biomass power production from solid biomass fuels vs. conventional disposal of the same biomass and production of a like amount of energy from fossil fuels. The uncompensated societal benefit was estimated to be more than 11 cents / kWh—greater than the value of the income from electricity production alone. Approximately eighty percent of the total benefits are attributable to the productive use of biomass resources; the remainder is due to the displacement of fossil fuel use. The quantified impact included includes consideration of air pollutants, greenhouse gases, landfill consumption, and forest productivity improvements.

Uncompensated (Ancillary) Benefits of Biomass Energy Production (from 1999 NREL Report)	
US Biomass Fuel Mix	
	<u>thousand bdt/yr</u>
Mill Residues	6,400
Forest Residues	1,800
Agricultural Residues	2,300
Urban Wood Residues	1,400
Total	11,900
Value of the Benefits	
	<u>¢ /kWh</u>
Criteria Pollutants	4.3
Greenhouse Gases	5.9
Avoided Landfill	1.1
Timber Stand Improvement	0.1
Total Benefits, US Biomass fuel mix	11.4

An important benefit of biomass energy production is the reduction of greenhouse gas emissions relative to the non-productive use of biomass fuels. Agricultural and municipal biomass fuels shift the form of emissions from methane to carbon dioxide (methane is almost 25 times more detrimental as a greenhouse gas than CO₂ on an instantaneous basis. Use of woody biomass for energy production lowers emissions relative to open burning because open burning emits unburned hydrocarbons that double or triple impacts on climate relative to controlled combustion in a biomass boiler.

There are significant policy barriers to realizing the integrated benefits of biomass energy and making the use of biomass resources more economic. The key problems are that the social and economic benefits are not compensated in the commercial market place. Air quality standards usually ignore the impacts of alternative disposal practices for the same resource. Permitting issues continue to pose challenges both in siting new production plants and in gaining access to the resources that could serve as fuel.

Recommendations

The Biomass Task Force developed the following ten recommendations to respond to challenges that biomass resource from meeting its true energy, environmental, and economic potential. The recommendations come from an analysis of the most important barriers to competitiveness of the resource relative to other fuel sources and barriers to realizing the benefits of the resource that come from avoiding the environmental costs of not using woody or wet biomass as an energy source.

The Task Force stresses in the report that each recommendation is an important step in realizing the full use of biomass. Selecting one or two of the recommendations will not have the same effect as if those same recommendations were implemented along with the others. The recommendations with brief descriptions follow:

1. Achieve Tax Parity Among Renewable Technologies.

Governors should work at the federal level with their congressional delegations to promote biomass as part of the Production Tax Credit contained in Section 45 of IRS Regulations. Parity should be achieved with wind and geothermal technologies in credit level and the credit should be permanent. Credit for existing facilities should be extended to ten years to match current provisions for new facilities. At the state level, Governors should advocate for parity in state tax incentives and they should be based on actual energy generation (both heat and power) as opposed to investment tax incentives. Again, programs should be at least for ten years. Parity continues to net metering for plants of less than 1 MW of production. Compensation should be provided for export of excess power. The western governors can play an important part in ensuring the widespread adoption of these policies across the region.

2. Strengthen Federal Land Management Policies to Allow Larger, Longer Restoration Projects.

Only long term, large-scale activities will attract infrastructure investment. Governors should work within their borders with federal land managers to ensure that they are using the most appropriate land management tool such as stewardship contracting or timber sale methods. Contracting tools are most helpful when they are long term (20 year minimum) and large scale (up to 150,000 acres or larger). Contracts should be based on the science-based needs of the resource to improve forest health. Project parameters should be collaboratively decided at the local level on a project-by-project basis. There should not be pre-determined artificial constraints on material use or tree diameter size. These should also be collaboratively determined based on the science-based needs of the resource. Arbitrary constraints hinder the commercial viability of the resource.

3. Environmental Benefits of Biomass Should Be Paid For by Beneficiaries.

Governors should advocate their legislatures and regulatory bodies on behalf of the ability of biomass projects to help solve problems such as waste disposal, air quality and forest land/ fire management. Solutions could include fuel subsidies and “biomass only” RFPs to address specific situations. Above-market costs should be borne by the primary beneficiaries of the environmental and waste management services. If utilities are the entities selected to provide supplemental support to biomass power, they should receive cost recovery for those activities.

4. Demonstrate Government Leadership by Purchasing Power/RECs from Biomass Projects and by Supporting Biomass R&D.

The state and federal governments should purchase biomass power directly, or an equivalent amount of RECs, to meet renewable purchase requirements. This would be a tangible demonstration that agencies realize the benefits biomass brings in addressing air quality, forest health, landfill space and rural economic growth. Programs should rely on incentives that are independent of annual budget and appropriations cycles.

The Governors should also take a leadership role in supporting cost shared R&D in partnership with the private sector to demonstrate the use of new biomass technologies and to conduct engineering development research that will lead to near-term commercialization of improved conversion and harvesting technology.

5. Recognize the Value of Firm Capacity in Renewable Purchase Programs.

The Governors should work with the state utility commissions to ensure that utility renewable purchase programs (RPS or otherwise) recognize the firming capacity of biomass by establishing the appropriate price structure. The ability of biomass to provide constant power is both a benefit in and of itself and it can also be used to address the intermittent nature of other resources.

6. Renewable Energy Credits Should Not Include Ancillary Environmental Benefits.

The many benefits of biomass may be accounted for in future credit schemes (such as air quality compliance) and can bring added value to the resource. Current RECs should be defined in a way that they only transfer the renewable nature of the power and only the environmental benefits that result directly from displacement of a like amount of fossil fueled generation.

7. Establish a Single Definition for Biomass.

Governors should work with their state public utility commissioners and green power certification groups to require that the FERC definition of biomass (18CFR Part 292.202) is used to determine the eligibility of the resources as renewable. This definition, “any organic material not derived from fossil fuels,” affords biomass energy projects the greatest opportunity and flexibility to use technology innovation to create productive uses for all types of biomass materials. The ability of biomass facilities to choose from the wide array of biomass resources while conforming to all federal, state and community environmental standards will allow the technology to improve both on technical performance and on production economics.

8. Revise Utility Interconnection Policies.

Governors can work with their state public utility commissions to recognize the importance of recognizing that remote plants support local load and voltage support. This would help prevent artificial imposition of line losses and promote reliability in remote areas. An emphasis on centralized load centers falsely works from the assumption that all power is consumed from a centralized location.

9. Provide Long-Term Certainty for Biomass Programs.

Governors should require that long-term programs in support of biomass should be implemented. Long-term power purchase contracts, fuel supply incentives, tax credits

and other measures will help provide the investment environment needed for infrastructure growth.

10. Consider Fuel-Based Emissions When Issuing Air Quality Permits.

The avoided emissions of air pollutants from biomass plants' fuel, if that fuel is left to its alternate fate, should be recognized and credited to the biomass plants in the permitting process. True netting of the plant emissions should be done.

Further Task Force Work

Biomass Task Force Recommendation: In addition to the ten vital policy recommendations above, the Task Force believes that a follow-up effort building on the supply analysis performed for this report is needed to provide a clearer vision for the CDEAC and WGA of how the next era in the development of biomass resources would unfold. Teams comprised of task force members working on an integrated follow-on analysis can provide answers to key questions the task force could not address in the timeframe given and with readily available data used and generated. The crux of this analysis is to set forth the sequence for developing each of primary resources (with key improvements in resource estimates) in tandem with the conversion technologies and in response to the proposed policy measures. This analysis would directly consider the question of what is the likely mix of end uses by among heat, power, transportation fuels and Bio-based chemicals/products. Answering these key questions will provide the basis for crafting the implementation details of policy changes recommended by the Task Force.