

**Biomass Energy Development Working Group
2011 Interim Report
January 9, 2011**

Pursuant to No. 37 of the Acts of the 2009 Session

January 2011

Legislative Council
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**Biomass Energy Development Working Group
Interim Report**

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**Biomass Energy Development Working Group
Members**

One member of the House of RepresentativesRep. Chris Bray

One member of the SenateSen. Ginny Lyons

The secretary of natural resources or designee.....Secretary Jonathan Wood

The commissioner of public service or designee.....Currently vacant

A representative of the biomass energy resource center.....Chris Recchia

Two representatives of the forest products industry.....Rocky Bunnell, Paul Cate

Two representatives of natural resources or environmental organizations.....
.....Jamey Fidel, Robert Turner

Two representatives of an industry or utility that produces electricity or heat from
biomass.....Peter Condaxis, Bill Kropelin

A representative of the Vermont woodlands association.....Sam Miller

A representative of a university or college with a focus on biomass.....Bill Keeton

A representative of the consulting foresters association.....Ben Machin

A representative of the forest guild.....Ehrhard Frost

Biomass Energy Development Working Group Charge

No. 37 of the Acts of the 2009 Session

Sec. 1. BIOMASS ENERGY DEVELOPMENT WORKING GROUP

(a) The biomass energy development working group is established to enhance the growth and development of Vermont's biomass industry while also maintaining forest health. In order to meet these goals, the working group shall analyze current issues in the biomass industry in order to develop a coherent body of recommendations. These recommendations may include incentives, harvesting guidelines, and procurement standards for the development and operation of biomass energy in the state of Vermont. The working group shall also include the following members:

- (1) One member of the house, appointed by the speaker of the house;
- (2) One member of the senate, appointed by the committee on committees;
- (3) The secretary of natural resources or his or her designee;
- (4) The commissioner of the department of public service or his or her designee;
- (5) A representative of the biomass energy resource center, appointed by the committee on committees;
- (6) Two representatives of the forest products industry that represent logging, processing, or wholesale operator interests, one appointed by the committee on committees and the other appointed by the speaker of the house;
- (7) Two representatives of natural resources or environmental organizations that represent wildlife and biodiversity and forest health and sustainability interests, one appointed by the committee on committees and the other appointed by the speaker of the house;
- (8) Two representatives of an industry, organization, utility, or corporation that either produces electricity or heat from biomass or purchases power from biomass, appointed by the governor.
- (9) A representative of the Vermont woodlands association appointed by the governor;
- (10) A representative of a university or college with a focus on biomass policy or research appointed by the speaker of the house;
- (11) A representative of the consulting foresters association of Vermont appointed by the governor; and
- (12) A representative of the forest guild appointed by the speaker of the house.

(b) The working group is authorized to operate for a maximum of three years in order to review the adequacy of its initial recommendations, continue research and analysis, and make additional recommendations to the legislature. The working group is authorized to hold four meetings each year during the interim between sessions of the general assembly. The working group shall elect co-chairs at its initial meeting, and one of the co-chairs shall be a member of the general assembly. For attendance at a meeting when the general assembly is not in session, legislative members of the commission shall be entitled to the same per diem compensation and reimbursement for actual and necessary expenses as provided members of standing committees under 2 V.S.A. § 406.

(c) The working group shall issue interim reports to the house and senate committees on agriculture and on natural resources and energy on or before November 15 of 2009 and 2010. The reports shall include:

(1) recommended fiscal and regulatory incentives for the promotion of efficient and sustainable uses of local biomass for energy production and opportunities for offering more predictability in the permitting process;

(2) recommended guidelines or standards for maintaining forest health, including model harvesting and silvicultural guidelines for retaining dead wood and coarse woody material; maintaining soil productivity, wildlife, and biodiversity and other indicators of forest health; and wood procurement standards. In reviewing and recommending standards for biomass procurement, the working group shall review whether:

(A) separate procurement standards are necessary for certain consumers of biomass, such as retail electricity;

(B) there are obstacles or policy considerations that need to be overcome to establish model procurement standards for biomass energy facilities;

(C) a uniform procurement standard for maintaining forest health would offer more predictability in the permitting process;

(D) procurement standards can be designed to effectively monitor whether the collective demand for energy produced from biomass does not impair long-term site productivity and forest health;

(E) it is feasible to coordinate with adjoining states to develop a regional procurement standard for biomass energy facilities.

(F) biomass procurement standards should require third-party certification; and

(G) a standard should be developed that would require biomass electricity generating facilities to provide for a fuel efficiency of at least 50 percent over the course of a full year.

(3) Recommend standards and policies for the design of new renewable energy from biomass that are designed to promote sustainable, efficient, local, and fair use of biomass supplies.

(4) Recommend additional research and analysis that is needed to ensure that forest health is maintained while providing for a sustainable, long-term supply of local biomass for the production of energy and forest products.

(d) On or before November 15, 2011, the working group shall submit to the house and senate committees on agriculture and on natural resources and energy a final report addressing the issues in subdivisions (c)(1)–(4) of this section.

(e) Prior to reporting to the general assembly under subsections (c) and (d) of this section, the working group shall allow for public review and comment of any proposed recommendations for incentives, guidelines, or standards for the development and operation of biomass energy. At a minimum, the working group shall allow the department of forests, parks and recreation; the department of fish and wildlife; the public service board; the agency of agriculture, food, and markets; the Vermont economic development authority; and the department of public service to review and offer comments on any proposed recommendations for incentives, guidelines, or standards. In addition, the working group should coordinate with the Forest Roundtable to hold a minimum of two meetings to collect stakeholder input and gather expert testimony on the issues included in this section.

(f) The working group shall seek funding from available funding sources to hire consultants and conduct research and analysis related to the issues included in this section. In no event shall the working group seek more than \$200,000.00 under this subsection. Funding acquired by the working group shall be administered by the office of legislative council.

(g) As used in this section, “biomass” means material from trees, woody plants, or grasses, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, farm, rangeland, or wildland-urban environment that is the product of forest management, land clearing, ecosystem restoration, or hazardous fuel reduction treatment.

(h) Legislative council shall provide legal and administrative services to the working group. The department of forests, parks and recreation shall provide technical and economic advice to the working group.

I. Overview

No. 37 of the Acts of the 2009 Session of the Vermont General Assembly (Act 37) established a Biomass Energy Development Working Group (the Working Group) that would meet over the course of three years to address how to enhance the growth and development of the Vermont woody biomass industry while also maintaining forest health. Under its charge, the Working Group is to issue two interim reports and one final report to the Vermont General Assembly. The Working Group issued its first interim report in January 2010. This report is the second interim report of the Working Group.

The Working Group met nine times in 2010 to fulfill the statutory charge of Act 37 of the 2009 Session.¹ Section 1(c) of Act 37 requires the reports of the Working Group to address the following four issues related to the promotion, development, and health of Vermont's woody biomass industry and the forests of the state:

- 1(c)(1): Recommended fiscal and regulatory incentives for the promotion of efficient and sustainable uses of local biomass for energy production and opportunities for offering more predictability in the permitting process.
- 1(c)(2): Recommended guidelines for maintaining forest health, including model harvesting and silvicultural guidelines for retaining dead wood and coarse wood material; maintaining soil productivity, wildlife, and biodiversity, and other indicators of forest health; and wood procurement standards.
- 1(c)(3): Recommended standards and policies for the design of new renewable energy from biomass that are designed to promote sustainable, efficient, local, and fair use of biomass supplies.
- 1(c)(4): Recommended additional research and analysis that is needed to ensure that forest health is maintained while providing for sustainable,

¹ The minutes of each meeting of the Biomass Energy Development Working Group are attached in Appendix B of the hard copy of this report. The minutes may also be accessed electronically at the Working Group's website, available at <http://www.leg.state.vt.us/workgroups/BioMass/>.

long-term supply of local biomass for the production of energy and forest products.²

In 2009, the Working Group formed three subcommittees to address the four issues that the Vermont General Assembly required under Act 37 to be included in each report of the Biomass Energy Development Working Group. The Working Group charged a Biomass Enhancement and Development Subcommittee with addressing Sections 1(c)(1) (recommended fiscal and regulatory incentives for the promotion of efficient and sustainable uses) and (3) (recommended standards and policies for the design of new renewable energy from biomass). The Working Group formed the Forest Health Subcommittee to focus on Section 1(c)(2), (recommended guidelines for maintaining forest health and for wood procurement standards). The Funding Subcommittee was formed to address issues related to Section 1(c)(4) (recommended additional research and analysis that is needed to ensure that forest health is maintained while providing for a sustainable, long-term supply of local biomass for the production of energy and forest products). In completion of its charge, the Funding Subcommittee focused on revisions and improvements to the Biomass Energy Resource Center (BERC) 2007 Vermont Wood Fuel Supply Model. As a result, the Working Group, as reflected in this report, now refers to the Funding Subcommittee as the Modeling Subcommittee.

Section II includes subcommittee proposals adopted and approved by the Working Group as a whole as recommendations of the Working Group. The Appendices include a draft Recommended Guidelines for Maintaining Water Quality, Soil Productivity, and Biological Diversity on harvesting jobs in Vermont; a list of forest health monitoring activities in the state; and the minutes of the meetings of the Working Group.

It is worth emphasizing that the Working Group's charge pertains to *woody* biomass, that is, material from trees, or woody plants, including limbs, tops, needles, leaves, and other woody parts. The Working Group acknowledges that other forms of biomass hold promise as sources of energy; however, this report is limited to the scope of the Working Group's charge. Unless the context clearly indicates otherwise, references in this report to "biomass," with or without the word "woody," should be read to mean woody biomass.

² Act No. 37, 2009 Sess., § 1(c).

II. Working Group Findings

The Working Group formally voted to approve the following recommendations, standards, or guidelines proposed by the working group's subcommittees.

A. The Modeling Subcommittee

1. Recommended Additional Research and Analysis to Ensure that Forest Health is Maintained while Providing for Sustainable, Long-Term Supply of Local Biomass for the Production of Energy and Forest Products.

i. Background

Central to the issue of biomass development is the question of the capacity of the forest to provide feedstock. Over the last 50 years, the state of Vermont has consistently grown more wood volume than has been removed, and consequently, volume in the state's forests has been increasing. However, the calculation of "available" supply from this inventory is not simple. Harvest levels for all wood products fluctuate with market demand and price. Rates of forest growth and mortality are neither constant nor linear. The land base itself may gain or lose forest over time. Parcel size and configuration can impact supply, as can the attitudes of landowners with respect to harvesting. All of these things contribute to uncertainty and risk for policy makers, regulators, and developers.

Averaged over the last 10 years, roughly 1.2 million green tons of high-valued products (saw logs and veneer) and 1.5 million green tons of lower-quality wood have been harvested each year. Residential firewood and pulp quality wood are the major components of the low-quality category, and with increases in fuel oil prices and the closing of pulp mills in New Hampshire, firewood now accounts for one-half or more of the lower-quality harvest volume. To further put these numbers in perspective, the McNeil Generating Station in Burlington and the Ryegate Power Plant combined consume roughly 435,000 green tons of harvested chips, with less than one-half of that amount estimated to come from within Vermont. Various recently proposed wood pellet plants typically demand 200,000 green tons. A currently proposed combination electrical-generation and pellet plant would, if permitted and constructed, demand over 500,000 tons per year. New demand does not necessarily or immediately create new, additional harvested wood from the forest. Some of what is now sold as firewood or pulp could

easily be diverted to competing uses. Not all of a new plant's supply will necessarily come from within Vermont—imported wood from adjacent states is likely.

The reader should draw the following points from this discussion. Under any development scenario, the supply of the woody biomass is influenced by physical, cultural, and economic factors. Promoting “efficient and sustainable” use, as called for in Act No. 37, requires that these factors influencing available supply be explored and understood. The sustainable supply question is highly complex, and no public interest is served by simple answers to complex questions.

ii. BERC Vermont Wood Fuel Supply Model

In 2009, the Working Group voted to encourage the revision of the Biomass Energy Resource Center (BERC) 2007 Vermont Wood Fuel Supply Model. The BERC Wood Fuel Supply Model was developed in 2007 based on the most current U.S. Forest Service Forest Inventory and Analysis (FIA) data available, which were from 1997. New FIA data were issued in 2010, and the working group concluded that revision of the Wood Fuel Supply Model to reflect the more current data would be prudent and would be a valuable tool for evaluating opportunities for harvesting and biomass energy production in Vermont.³ The Vermont Department of Forests, Parks and Recreation subsequently obtained funds and contracted with BERC to update the wood supply model using the new FIA data.

BERC integrated the new FIA data into the wood supply model and issued a final report detailing the updated findings. BERC completed the wood supply model in three “runs”—conservative, moderate, and intensive. The moderate run was intended to serve as the best representation of reality, while the conservative and intensive scenarios depict the respective lower and upper limits of the model. The Working Group utilized the moderate scenario of the wood supply model. The moderate scenario makes a variety of assumptions about the extent of the available land base, the impacts of physical constraints (slope, elevation, access, etc.), the inclination of the landowner toward harvesting, and other factors. The BERC wood supply -

³ Revisions to the BERC Wood Supply Model are due to methodological changes in how the U.S. Forest Service calculated the 2010 FIA forest inventory. The methodological changes are described in the BERC report available at <http://www.biomasscenter.org/index.php/resources/publications.html>

model focuses on the yield of woody forest biomass under current forest conditions and management. The moderate scenario of the model indicates that there is slightly over 900,000 green tons of surplus low-grade wood grown annually in Vermont that could be used to advance woody biomass energy in the state. The model does not incorporate a move toward more intensive silvicultural practices, plantation type silviculture, dedicated energy crops, or any agricultural biomass. BERC's full report updating the wood supply model is available at <http://www.biomasscenter.org/index.php/resources/publications.html>

iii. Substantive Revisions of the BERC Vermont Wood Fuel Supply Model

BERC acknowledged limitations in the methodology employed in the original Vermont Wood Fuel Supply Model. The Modeling Subcommittee, in collaboration with BERC and the Vermont Department of Forests, Parks and Recreation, is developing a plan to address these limitations. The plan will address: the methods used to grow the forest inventory; assumptions about supply curves, costs, and other factors influencing production; extending the time frame of the model to reflect the lifespan of a biomass facility; land use change over time; and the integration of system concepts to allow for interaction of the various components of the model. The Working Group believes that strengthening the model will allow for a more accurate quantification of net available low-grade growth (NALG) wood, thereby addressing the concern of the public regarding the sustainability of harvesting for biomass energy production. The Working Group expects substantive developments on this issue to be completed and presented to the group by the summer of 2011.

iv. Additional Research and Analysis

The Working Group believes that as the BERC Vermont Wood Fuel Supply Model is updated and the substantive inputs revised, additional research will be necessary to address gaps in data, monitoring, and analysis. As part of identifying these gaps, the Modeling Subcommittee requested a summary of existing monitoring efforts in place. Attached in Appendix C is a summary of identified ongoing monitoring activities. The Working Group recommends that this list be updated to include ongoing monitoring by other public and private entities and will

recommend, at a later date, an entity to perform this updating. The Working Groups, through the Modeling Subcommittee, will review this existing monitoring for results and implications on forest policy. The Working Group recommends that monitoring data be linked to periodic model reassessments, and the resulting information be used to inform policy. An additional area for analysis is monitoring the implementation of the woody biomass retention guidelines to gauge if and how they are being implemented.

B. Biomass Enhancement and Development Subcommittee

In 2010, the Working Group voted to approve the recommendation of the Enhancement and Development Subcommittee. The findings of the Working Group related to enhancement and development are set forth below under a discussion section followed by headings that reflect the statutory charge to the Working Group.

1. Discussion

Successful enhancement and development of biomass energy use in Vermont is dependent on several factors. Foremost is ensuring the fuel supply promoted is appropriate in quantity and type such that its use is sustainable over time, indefinitely. While woody biomass is renewable, it is not inexhaustible. Priority must be afforded the ecosystem values Vermont holds for its forests, with an eye toward protecting all values – from habitat and biologic diversity to the visual landscape and recreation – and many in between, including water quality, soil conservation, climate mitigation, and air quality. Still, healthy forests that preserve and enhance these values in many cases require management, and in the process of accomplishing this management, biomass for energy will be made available. Section C of this interim report, on forest health, identifies factors that should be addressed to provide this balance, and this section of the report discusses how the Working Group recommends Vermont go about making best use of the biomass made available through this management work.

Several facts are relevant to deciding where and how to enhance and develop the resource. The first is that Vermont forestlands are approximately 85 percent privately owned, and any plan must work to ensure that landowners want to and can retain their lands as working

forests indefinitely, and the second is recognition that the Northeast in general and Vermont specifically is heavily dependent on oil for much of its energy needs, both in transportation and in building heat which makes this portion of the region's energy profile most vulnerable and least secure. While use of biomass to create transportation fuel (cellulosic ethanol) is receiving a great deal of investment and attention from the U.S. Department of Energy, it remains in the developmental stage and would use a great amount of the resource for a relatively small portion of transportation fuel demand. Accordingly, the Working Group does not believe that biomass for production of transportation fuels would be a wise use of the wood resource, as even full commitment of biomass to this effort would do little to affect energy security and have a likely negligible effect on gasoline prices.

Accordingly, the enhancement and development of the woody biomass energy industry in Vermont should attempt to use the available resource sustainably, in a manner that maximizes efficiency while meeting energy goals and focus on sectors of growth where the use of biomass can have beneficial localized impact on our energy reliability, security, and cost. Over the next year, the Working Group will examine the pros and cons of these areas of growth:

i. Commercial/Industrial Thermal and Thermal-led CHP

A major component of growth in the use of woody biomass for energy in Vermont will be the continued conversion by facilities that burn fossil fuels (typically oil and propane) to wood fuels (wood chips or wood pellets) in heating and cooling applications, and where appropriate, combined heat and power (CHP) systems. There have already been many successful conversions from oil to wood, particularly in: elementary/high schools, government offices, hospitals, industrial parks, and college campus facilities. Efforts are under way to demonstrate successfully municipal (district energy) applications in one or more communities in Vermont. The positive track record and financial benefits of these existing biomass conversions make the concept of wood energy more acceptable. This particular market to expand the use of woody biomass fits three important criteria when considering public acceptance in Vermont: small, local, and sited in (or near) existing facilities.

ii. *Wood Pellet Manufacturing/Use*

There is potential for increased biomass use by the residential sector in the form of replacing home oil heating systems with wood pellet stoves, furnaces, and boilers. The spike in the price of heating oil in 2008 prompted a rush toward wood pellets; this has abated somewhat since oil prices have dropped, but pellet systems are still a viable alternative for many residential and smaller commercial applications. Wood pellet manufacturing would also provide an efficient year-round market for woody and potentially agricultural biomass. The appropriate number of new pellet plants is difficult to determine as the market for wood pellets will have to grow in kind, addressing the current “chicken or egg” situation.

iii. *Electrical Generation*

The Working Group supports the continued evaluation of one additional large-scale (20–25 megawatt) wood-fired electrical generating facility located in southern Vermont (south of U.S. Route 4). This evaluation should include an assessment of the pros and cons of such a facility, including utilizing excess heat in the form of CHP or other technologies to improve plant efficiency and providing a year-round market for biomass fuel and “anchor” a wood supply network in the four southern Vermont counties. The location of any such facility would need to be coordinated with Vermont’s utilities and VELCO to maximize balance for their systems.

2. Recommended Fiscal and Regulatory Incentives for the Promotion of Efficient and Sustainable Uses of Local Biomass for Energy Production and Opportunities for Offering More Predictability in the Permitting Process

Working Group recommendations on fiscal and regulatory incentives are set out immediately below. One issue that applies to most, if not all, of these recommendations is the need to determine the implementing entity and to identify the funding source for the recommended action. Examination of this issue will continue following publication of this interim report.

To promote the expanded use of woody biomass in commercial/industrial thermal and thermal-led CHP applications, an effective outreach program must be created to inform potential candidates. Many locations have already been identified; however, a more complete list should

be compiled. High-priority sites are locations where a thermal load uses extensive amounts of heating oil or propane. An analysis of existing programs and organizations that reach out to potential biomass users should be done. A comprehensive information package explaining biomass energy and highlighting successful wood conversion projects should be produced and made available to potential conversion sites. The package should also contain information regarding how to begin and negotiate the state regulatory process. The Working Group further recommends that the General Assembly enact legislation that specifically enables municipalities to create and operate heating districts. The Working Group recommends as well that, as soon as feasible, the General Assembly lift the current suspension on applications for state aid for school construction⁴ at least for the purpose of supporting school conversions to woody biomass energy, with the state providing between 60 and 75 percent of the funding for these conversions.

The Working Group supports the concept of new wood pellet manufacturing facilities in Vermont. Project developers should be provided with information and guidance regarding the state's regulatory process. With respect to residential use of wood pellets, enactment of legislation such as that proposed in the 111th Congress – the Home Star Energy Retrofit Act of 2010 (H.R. 5019, S.3177) – would support home conversions to efficient wood pellet heating appliances by providing rebates. Growth in residential pellet use will need to coincide with increased pellet production, which is difficult to predict (see above).

Woody biomass projects that produce electricity would be subject to Vermont's "Section 248" permit process, which may take years from the initial application to project approval. As an example, Ryegate Power Station's Section 248 process took 2½ years from the time of application to final permit approval.

When considering expansion of the biomass industry in Vermont, it is important to improve the Section 248 application process to increase predictability and reduce processing time. Such improvement could result from a comparison of the Section 248 process with other permit programs, with a focus on helping developers in the preparation of their project applications. For example, the Act 250 program has crafted an application form that includes detailed guidance for an applicant. While the Public Service Board (PSB) has issued an

⁴ 2007 Vt. Laws No. 52 § 36.

application form for net metering systems – which by law are of limited size⁵ – the PSB could create a form applicable to larger energy projects. The PSB also should consider the assignment of a person or persons who can assist the applicant in completing the application form in the same manner as Act 250 coordinators do today. In addition, incentives should be developed to provide model approaches to issues that can add further delay to a project if not handled in an appropriate way, such as procurement standards, forest health issues, air quality requirements, and other issues that are important to the affected public.

Enhancement of Vermont’s biomass industry should come in the form of incentives, including tax credits, low-interest loans, favorable power rates, and renewable energy credits. These incentives must be balanced to level existing “playing fields” and not to favor one form of biomass use over another, or at the exclusion of others.

3. Recommended Standards and Policies for the Design of New Renewable Energy from Biomass That are Designed to Promote Sustainable, Efficient, Local, and Fair Use of Biomass Supplies

Working Group recommendations on standards and policies for design are set out immediately below. The statements above regarding the issue of identifying the implementing entities and funding sources for the recommended actions, and for continued examination of this issue, apply to these recommendations as well.

While commercial/industrial thermal load or thermal-led CHP systems are the most efficient use of biomass for energy generation, supplying this type of facility with biomass fuel is complicated by the seasonal nature of its operations because more wood is needed during colder months. This complication negatively affects biomass producers who need to keep their products moving year-round. The Working Group recommends the support and enhancement of the network of biomass suppliers located at various areas around the state, based on a business model similar to Lathrop Forest Products in Bristol VT, a successful wood fuel supply system that provides woody biomass products to a variety of markets on a year-round basis.

⁵ 30 V.S.A. § 219a.

The siting of new wood pellet manufacturing facilities should be dispersed among various areas around the state. Wood availability numbers and existing supply infrastructure will have to be considered before pursuing multiple sites.

With regard to a new biomass electric plant, existing biomass suppliers in Windsor, Windham, Rutland, and Bennington Counties now must truck their wood chips to markets outside this area; in evaluating the pros and cons of a plant located in this region, one consideration would be the significant shortening of haul distances, making biomass production local and more economic, as well as reducing consumption of diesel fuel.

The Working Group's charge includes considering whether to require 50 percent efficiency for new woody biomass projects. This efficiency level is attainable with some CHP systems, but is not possible in a stand-alone electric generating facility, given current technology. Every effort should be made to site and develop plants that make as much use of heat as possible. However, in the case of an electric generating facility in southern Vermont, a 50-percent efficiency requirement may not be achievable.

In addition, on the issue of fuel efficiency, there is a distinction between incentive and regulatory programs. To date, Vermont statutory requirements related to the fuel efficiency of woody biomass energy projects have come in the context of incentive and not regulatory programs. For example, the "standard offer" program administered by the Public Service Board, under which up to 50 megawatts of renewable energy may contract for energy prices that are set to provide incentives for renewable energy development, requires that an eligible woody biomass project must have a design system efficiency of at least 50 percent.⁶ It is reasonable to condition the provision of these incentives on achieving a fuel efficiency standard that the market may not otherwise produce. However, given the interconnection of the regional power grid, establishing a regulatory fuel efficiency standard in Vermont may not be productive in the absence of a regional standard.

Accordingly, rather than requiring 50 percent fuel efficiency for all woody biomass energy projects, the Working Group recommends that the General Assembly direct that the PSB, in its Section 248 proceedings, require that each woody biomass energy facility be designed for the optimum fuel efficiency. Woody biomass energy projects that are not subject to Section 248

⁶ 30 V.S.A. § 8005(j).

review should also be required to meet this standard if they are subject to other siting or land use proceedings such as Act 250 or local land use review.

C. Forest Health Subcommittee

Act 37 requires the Working Group to include in its reports recommended guidelines for maintaining forest health and recommended wood procurement standards. To fulfill this charge and to develop these recommendations, the Working Group established the Forest Health Subcommittee. In 2010, the Working Group voted to approve the recommendations of the Forest Health Subcommittee. The findings of the Working Group related to Forest Health are set forth below under headings that reflect the statutory charge to Working Group.

The Working Group recognizes that issues pertaining to site suitability for biomass harvesting (including the intensity of harvest) require further consideration in the upcoming year. In addition, the Forest Health Subcommittee will investigate approaches for monitoring biomass harvesting activities for impacts on forest health. In conducting such an investigation, the Working Group shall consider or review site analysis criteria for protection of threatened and endangered species, rare natural communities, fragile sites, old growth forests, low nutrient sites, steep slopes, and erosion prone sites. The Working Group also will consider systems for education and outreach to loggers, foresters, landowners, and biomass consumers regarding implementation of the harvesting guidelines, as well as policies and incentives for adhering to an as yet developed biomass procurement standard. Further, over the coming year, the group will evaluate whether periodic assessments are necessary to determine the adequacy of the AMPs to safeguard aquatic resources subject to potential impairment due to intensified harvesting activities.

The Working Group also feels that it is important to let the public and the General Assembly know that the group is aware of the potential importance of greenhouse gas emissions to forest health, and that this subject has been added to the list of Further Working Group Action in Section III of this report. Moreover, the list of Further Working Group Action includes, as number 2 on the list, how to account for or quantify carbon accounting, and the Working Group wishes to reiterate support for giving carbon accounting more consideration in the next year as well.

1. Recommended Guidelines or Standards for Maintaining Forest Health, Including Model Harvesting and Silvicultural Guidelines for Retaining Dead Wood and Coarse Wood Material; Maintaining Soil Productivity, Wildlife, and Biodiversity, and Other Indicators of Forest Health

Over the past 10 years, the traditional fossil-fuel based energy markets have fluctuated significantly. These fluctuations have led states, businesses, and individuals to reexamine their energy supplies. One potential energy supply is woody biomass, and Vermont is fortunate to have significant forest resources--with over 4.5 million acres of forest land.⁷ As a result, there has been significant interest in utilizing available woody biomass in Vermont for energy and thermal production for uses once supplied by fossil fuels. The potential for these new and expanded woody biomass markets has prompted questions and interest regarding the possible impacts that increased timber harvests and associated disturbances would have on long-term site productivity, water quality, and biological diversity. To fulfill the statutory charge and to address questions raised regarding the potential impacts of increased harvests, the Working Group reviewed whether harvesting guidelines would be appropriate for Vermont. In its review, the Working Group examined: existing guidelines in Vermont; how other states and jurisdictions have addressed concerns regarding increased harvests; and the available science and research.

For over 30 years, Vermont has required its two wood-fired power plants to implement strategies to address public concern about forest health and other issues through procurement standards that require some review by the Vermont Department of Fish and Wildlife and professional foresters. The Vermont Department of Forests, Parks and Recreation has adopted Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMPs),⁸ and these practices, although not mandatory, have become an industry standard for timber harvests in Vermont. However, woody biomass retention standards do not currently exist for timber harvest operations in Vermont. Moreover, neither the AMPs nor the procurement standards for wood-fired power plants address soil productivity or biological diversity on harvest sites.

⁷ Vermont Department of Forests, Parks and Recreation, State Forest Resource Assessment (2010), *available at* <http://www.vtfpr.org/html/documents/assessments.pdf>

⁸ *Available at* <http://www.vtfpr.org/watershed/documents/Amp2006.pdf>.

Six other U.S. states⁹ have developed guidelines specifically for woody biomass harvesting. Other states address water quality, soil productivity, and biological diversity in comprehensive forest practices acts or rules.¹⁰ Additional states have adopted voluntary forest management practices that address water quality, soil productivity, and the retention of a variety of forest structures.¹¹ Similarly, the Canadian provinces of Nova Scotia, New Brunswick, and Quebec are in the process of developing biomass harvesting guidelines addressing similar issues.¹²

According to scientific research, the retention of forest structures, such as snags, cavity trees, and down material, provide wildlife habitat that helps protect and foster biodiversity.¹³ In contrast, consistent and quantifiable data on the relationship between removal of harvest residual and the resultant impact on forest soils are either absent, or at times, conflicting. One conceptual understanding, however, is that harvest residues and residual vegetation provide organic matter and nutrient inputs that sustain soil productivity. However, there is conflicting evidence that long-term soil productivity may be impaired by removal of large amounts of tree crowns on sites already sensitive to acid deposition and related calcium depletion.

Based on the lack of harvesting guidelines in Vermont, the guidelines in other states, available scientific research, and the conceptual understanding of soil productivity, the Biomass Energy Development Working Group adopted the *voluntary* guidelines set forth in Appendix A of this report for maintaining water quality, soil productivity, and biological diversity on all

⁹ See, Maine, Biomass Retention Guidelines (2010), *available at* http://www.maine.gov/doc/mfs/pubs/biomass_retention/report/biomass_report_lr.pdf; Michigan, Michigan Woody Biomass Harvesting Guidance, *available at* http://www.mi.gov/documents/dnr/WGBH_321271_7.pdf; Missouri, Missouri Woody Biomass Harvesting, Best Management Practices Manual, *available at* <http://mdc4.mdc.mo.gov/Documents/19813.pdf>; Minnesota, Biomass Harvesting on Forest Management Sites in Minnesota (2007); Pennsylvania, Guidance on Harvesting Woody Biomass for Energy in Pennsylvania (2008), *available at* http://www.dcnr.state.pa.us/pa_biomass_guidance_final.pdf; Wisconsin, Wisconsin's Forestland Woody Biomass Harvesting Guidelines (2008), *available at* <http://council.wisconsinforestry.org/biomass/pdf/BHG-FinalizedGuidelines12-16-08.pdf>.

¹⁰ See, e.g. California Forest Practice Rules, 4 Cal. C.F.R. chs. 4, 4.5, and 10.

¹¹ See, e.g. New Hampshire Division of Forests and Lands and the Society for the Protection of New Hampshire's Forests, New Hampshire Forest Sustainability Work Team, Good Forestry in the Granite State: recommended Voluntary Forest Management Practices for New Hampshire (1997), *available at* http://extension.unh.edu/resources/files/Resource000294_Rep316.pdf.

¹² See, Forest Guild, Alexander M. Evans, Robert T. Perschel & Brian A. Kittler, Revised Assessment of Biomass Harvesting and Retention Guidelines pp. 13-14 (2010) (discussing biomass guidance and policy in Canada).

¹³ See, e.g., Katherine Manaras Smith, William S. Keeton, Therese M. Donovan & Brian Mitchell, Stand-Level Forest Structure and Avian Habitat: Scale Dependencies in Predicting Occurrence in a Heterogeneous Forest, *Forest Science* 54(1) pp. 36-46 (2008).

harvesting jobs in Vermont. The Working Group concluded that the guidelines should be general, flexible, and easily understood and implemented by an operator working in the forest. The Working Group also concluded that the recommended guidelines, if implemented on a consistent basis, would help protect Vermont's forests and ensure a sustainable supply of a variety of products from those forests. The guidelines are not designed to be overly technical, nor are they designed to be mandatory. The Working Group encourages biomass producers and purchasers to employ guidelines that meet or surpass the recommended practices to minimize risks to ecological values.

To protect water quality, the Working Group recommends implementation of the Vermont Department of Forests, Parks and Recreation's Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont as necessary. Similarly, the Working Group recommends that landing size should be minimized to the extent possible and that, as is required under the AMPs, a functional buffer be maintained between lands and water resources. In addition, the Working Group recommends that a logger should minimize erosion on a trail after a harvest.

To protect soil productivity, the Working Group recommends that leaf layer disturbance at a harvest site be minimized unless required for regeneration. Stumps and roots should be retained intact, except as necessary for road landing and trail construction. Tree tops should be utilized as necessary to increase equipment flotation, and the proportion of retained tops should increase as harvest intensity increases or the cutting cycle decreases. Additionally, chipper waste should be returned to the forest on return skidder trips as practical and necessary.

To protect biological diversity, the Working Group recommends that a harvest operator retain as many snags, as safety, access, and land owner or harvesting permit. The Working Group recommends a minimum target for retained decaying trees and snags per harvest size. The group also recommends that down wood material be retained in place, and that incidental breakage on whole-tree harvests be retained in place as safety and aesthetics allow. In addition, a harvest operator should consider retaining newly cut material on site if large wood material is lacking. The Working Group also recommends that at least five percent of the stand be retained when performing salvage harvests unless such a practice would be contrary to state or federal government guidelines.

A full copy of the Forest Health Subcommittee's Recommended Guidelines for Maintaining Water Quality, Soil Productivity and Biological Diversity on Harvesting Jobs in Vermont is located in Appendix A of this report.

2. Recommended Guidelines or Standards for Wood Procurement

Section 1(c)(2) of Act 37, in part, requires the Working Group to include in its reports recommend wood procurement standards. In reviewing and recommending standards for biomass procurement, Act 37 requires the working group to review whether:

- (A) separate procurement standards are necessary for certain consumers of biomass, such as retail electricity;
- (B) there are obstacles or policy considerations that need to be overcome to establish model procurement standards for biomass energy facilities;
- (C) a uniform procurement standard for maintaining forest health would offer more predictability in the permitting process;
- (D) procurement standards can be designed to effectively monitor whether the collective demand for energy produced from biomass does not impair long-term site productivity and forest health;
- (E) it is feasible to coordinate with adjoining states to develop a regional procurement standard for biomass energy facilities;
- (F) biomass procurement standards should require third-party certification; and
- (G) a standard should be developed that would require biomass electricity generating facilities to provide for a fuel efficiency of at least 50 percent over the course of a full year.¹⁴

The Working Group reviewed these criteria and approved the following recommendations.

- i. § 1(c)(2)(A): Whether separate procurement standards are necessary for certain consumers of biomass, such as retail electricity.*

¹⁴ Act No. 37 of the 2009 Adj. Sess. (2010), § 1(c)(2)(A)-(G).

No, separate procurement standards are not necessary for certain consumers of biomass. Currently, the two biomass electric generating facilities at Burlington Electric Department and Ryegate Power station are the only facilities subject to a procurement standard. The Working Group recommends development of a model uniform procurement standard for all forest product facilities as discussed under subsections (ii) and (iii) below. The group shall attempt to formulate such standards as it continues its work in 2011. The group recognizes that application of a procurement standard to out-of-state consumers of Vermont forest products is an issue that the group would need to address in developing a uniform procurement standard.

ii. § 1(c)(2)(B): Whether there are obstacles or policy considerations that need to be overcome to establish model procurement standards for biomass energy facilities

Yes, obstacles and policy considerations do exist that must be addressed in establishing model procurement standards. For instance, there is significant support for development of a model procurement standard, but there are issues and obstacles to such adoption. There is debate regarding whether such standards should be voluntary or mandatory. In addition, the standards for procurement currently vary greatly from state to state across the region. Buyers and the market in general do not recognize state lines and are not limited to the procurement standards in any one state. Consequently, as discussed in subsection B(2)(v) below, the Working Group recommends that the state pursue a policy of regional coordination on a procurement standard.

iii. § 1(c)(2)(C): Whether a uniform procurement standard for maintaining forest health would offer more predictability in the permitting process

If a uniform procurement standard existed, it could provide predictability in the permitting process, but the permitting process or permitting standards for activities would need to be altered to incorporate a procurement standard. Biomass electric production in the state is currently the only activity subject to procurement standards as part of the Public Service Board permitting process. If the pool of permits subject to standards was increased or if a land use permit, such as an Act 250 permit, required procurement standards, a good, quality procurement standard could assist in permitting predictability, and compliance with such a standard might be given deference

by a regulatory or permitting authority. However, establishing a procurement standard that would allow for presumptions of permit compliance or presumptions of no environmental harm will be difficult to develop.

- iv. *§ 1(c)(2)(D): Whether procurement standards can be designed to effectively monitor whether the collective demand for energy produced from biomass does not impair long-term site productivity and forest health*

No, procurement standards alone cannot be designed to effectively monitor whether demand for biomass energy does not impair site-productivity and forest health. Additional monitoring independent of demand for biomass energy and independent of harvests in general is necessary to adequately monitor forest health and productivity.

- v. *§ 1(c)(2)(E): Whether it is feasible to coordinate with adjoining states to develop a regional procurement standard for biomass energy facilities*

Yes, from the perspective of the Working Group, it is feasible and desirable to coordinate with adjoining states to develop regional procurement standards. Adoption of regional procurement standards would have substantial benefit for biomass energy facilities and forest resources. The Vermont Department of Forests, Parks and Recreation has pursued such regional coordination, most recently through the New England Governors' Conference. However, the timing and implementation of a regional standard are difficult, and additional groundwork and negotiation are necessary before any foreseeable implementation.

- vi. *§ 1(c)(2)(F): Whether biomass procurement standards should require third-party certification*

No, if a procurement standard is established, the standard should not require third-party certification. However, the Working Group encourages land management and harvesting under the use value appraisal program, land conservation agreements, or third-party certification systems or subject to the advice and services of a professional forester, all of which could elevate the quality of forest practices and improve management of the state's forest resources.

Furthermore, some level of independent verification may need to be built into certain aspects of procurement standards that are developed for facilities, and the Working Group will research this over the course of the next year.

vii. *§ 1(c)(2)(G): Whether a standard should be developed that would require biomass electricity generating facilities to provide for a fuel efficiency of at least 50 percent over the course of a full year*

No. Using forest resources in the most efficient way possible is desirable, but a standard of 50 percent fuel efficiency over the course of a full year may not be possible for certain biomass energy facilities in certain locations in the state. The Working Group does not want to discourage the location or operation of such facilities. The Working Groups also recommends that the Public Service Board require each biomass energy facility to design for the optimum fuel efficiency. In addition, the discussion above in Sec. B.3 highlights the fuel efficiency standards currently incorporated in existing incentive programs. Consistently with this discussion, the Working Group recommends that economic incentive programs for biomass energy development incorporate strong fuel efficiency standards, and the Working Group will review this further.

III. Further Working Group Action

The Working Group will continue to meet in 2011 during the legislative session. In 2011, the working group intends to focus on multiple issues, including:

1. The State Energy Plan and its interplay with the recommendations of the Biomass Energy Development Working Group.
2. Issues related to greenhouse gas (GHG) emissions from biomass energy use in Vermont, including the impacts of GHG emissions on forest health, and whether and how to quantify or account for carbon impacts from such use.
3. The siting and permitting process for biomass energy facilities in the state and the extent to which they include review of woodshed impacts.
4. Impacts of biomass energy use on public health.

5. Alternative funding sources for the development of biomass energy in Vermont.
6. Monitoring of forest health, harvests, and woody biomass use.
7. Harvest practices at sites in Northern New England and New York as detailed by University of Vermont Professor Bill Keeton's recent research.
8. Management of forest resources.
9. Enhancement of existing activities and facilities, including the use of firewood.
10. Use of biochar.
11. Use of roundwood.
12. Use of short rotation woody crops.

Appendix A: Recommended Guidelines for Maintaining Water Quality, Soil Productivity & Biological Diversity on Harvesting Jobs in Vermont

Introduction

The potential for new and expanding markets for woody biomass fuels has prompted renewed interest in the possible impacts that increased removals and associated disturbance might have on long-term site productivity, sustainability and biological diversity. These concerns have led six states and three Canadian Provinces to develop or work toward development of biomass harvesting guidelines.

Vermont has nearly 30 years of experience with biomass harvesting standards required for its two in-state wood-fired power plants. However, these standards only apply to harvesting jobs that deliver wood to these two facilities; standards do not currently exist for harvesting jobs within the state that deliver wood elsewhere. In addition, the existing standards that apply to the state's two wood-fired power plants do not specifically address maintaining soil productivity or biological diversity.

Scientific support for provisions that address soil productivity and biodiversity is based on the concept that harvest residues and residual vegetation provide organic matter and nutrients that sustain productivity. Consistent and quantifiable data on the relationship between removals and residuals and the resulting inputs and outflows on forest soils is lacking, and at times conflicting. Scientific support for retaining forest structures such as snags, cavity trees and down material is based on research that evaluates the role these elements provide for a variety of wildlife and ecological functions. Unfortunately, there are too few studies, and too little baseline data or long-term monitoring to provide clear direction.

The Vermont Biomass Energy Development Working Group developed the following guidelines to provide recommended practices on protecting soil productivity and biodiversity for all wood harvests in Vermont. The guidelines are general, flexible, understandable, and easily implemented in the field. These are recommended guidelines, not mandatory, for protecting Vermont's forests and to ensure a sustainable flow of products.

A. Water Quality

1. Implement “Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont” (AMPs) as necessary.
2. Minimize landing size to the extent possible for the operation.
3. Maintain a functional buffer between landings, streams and wetlands.
4. Minimize erosion on trails after harvesting is completed.

B. Soil Productivity

1. Minimize disturbance of the litter layer except as required for regeneration.
2. Retain stumps and roots intact except as necessary for road, trail and landing construction.
3. Use tops as necessary to increase equipment floatation and stabilize harvest trails.
4. Retain organic matter on nutrient-impaired sites by partial cutting, leaving a portion of tree tops, or skidding after foliage has dropped. Increase the proportion of retained organic debris when cuts are heavy or rotations short.
5. Return chipper waste (broken stems, limbs, unutilized wood accumulated on the landing) on active operations to the harvest site on return skidder trips.

C. Biological Diversity

1. Retain as many snags as safety, access and owner objectives will permit. Refer to Table 1 below for target levels of retained structure.
2. Retain all pre-harvest down wood in place.
3. Retain breakage incidental to harvesting (broken branches, unutilized trees) within constraints of safety and aesthetics.
4. Consider retaining some newly cut material on site if large woody debris is lacking.
5. Salvage harvesting should leave at least 5% of the affected stand unharvested unless contrary to state or federal guidelines.

TABLE 1

Structure	Minimum Target/Ac*
Live decaying trees 12- 18” DBH	4
Live decaying trees > 18” DBH	1
Snags >10” DBH	5
*Retain smaller trees when suitable trees of these size classes are not present. <u>The highest priority must be safety, with specific regard to OSHA regulations.</u>	

It is recommended that the State consider a means for monitoring harvest operations for woody biomass and wildlife tree retention, and review/amend these guidelines every ten years as new information becomes available.

Appendix B: Biomass Energy Development Working Group; Minutes of Meetings

BioE: Biomass Energy Development Working Group
 MINUTES for January 12, 2010
 1:00 p.m. – 4:00 p.m.
 Room 410, 133 State Street

MEMBERS PRESENT: Rep. Chris Bray, Rocky Bunnell, Paul Cate, Peter Condaxis, Jamey Fidel, Erhard Frost, Bill Kropelin, Kelly Launder, Sam Miller, Chris Recchia, Robert Turner; Sec. Jonathan Wood.

MEMBERS NOT PRESENT: Sen. Ginny Lyons, Ben Machin,

STAFF PRESENT: Leg. Council Michael O’Grady, Asst. Catherine Russell, Leg. Intern Graham Leitner

Convened

Co-Chair Rep. Chris Bray convened the working group.

Minutes Reviewed

The working group voted to accept the minutes from the previous meeting on Nov., 3, 2009.

Discussion of Interim Report

The working group discussed Bill Keeton’s edits to the interim report:

- Appendix A
 - Bullet three: What is the definition of regional coordination? The group agreed that this should be more specific and include the language “regional coordination may or may not include procurement guidelines” – the goal should be to keep topics specific yet flexible
 - Bullet four: include language “the working group supports legislative action to increase truck weight limits for the transportation of forest products”

The group unanimously accepted the draft of the interim report with the edits on agreement that it was a work in progress and able to be altered throughout the discussions.

Discussion of Work Plans

Forest modeling

The group discussed several topics relating to modeling. It was stated that the most current data on forest modeling is not yet available for the U.S.D.A. Forest Inventory and Analysis (FIA), but when the data becomes available it will become an important part of biomass harvesting because it will be used to determine supply. The group then discussed whether the whole development of a biomass industry should be institutionalized using models that would show industry impacts over time, help with public outreach campaigns, and determine the logistics of the program including who pays for it and who provides updates to the models. Market modeling was also discussed as a way to help build a stable industry. The model should show how biomass markets respond to price fluctuations and what policies would support a biomass industry and which policies would support other forestry activities. Carbon modeling was discussed in terms of promoting carbon neutrality and long term carbon storage. Bill Keeton spoke on modeling that

UVM is engaged in. Carbon neutrality is based on time and special scales. Bill Keeton stated it would not be good policy to state that “biomass” is carbon neutral because it is a loaded term.

Enhancement and Development of Biomass Industry

The work plan for enhancing and developing a biomass industry should emphasize simplification. There should be incentives to start biomass projects that are relatively free of complications. Standards for efficiency of biomass projects are necessary to a sustainable industry. In addition, stability and consistency of markets promotes a viable industry that is diversified and supports individuals in the forest products industry. Members of the group stated concerns regarding the globalization of the biomass market. This is undesirable because it increases transportation of biomass material, decreasing its end efficiency. This would also be undesirable for local markets and local employment. Regional cooperation could help to resist the pressures of an overseas biomass market.

Maintaining Forest Health

The group discussed stewardship as the most efficient way to promote healthy forests. Start by determining what we want to retain in the forests versus what we want to remove from them. Include ongoing monitoring programs into the biomass industry objectives. The group discussed using procurement standards to encourage good forestry practices on the ground. Procurement standards will level the playing field if they can encourage the development of markets that favor sustainable harvesting methods. Using the standards, biomass purchasers would pay higher premiums for wood that is grown and harvested according to certain management standards. The greater the consistency in procurement standards, the greater the consistency in best management practices. The committee will set aside more time at a later date to further discuss procurement standards and best management practices. The forest health subcommittee will report more specific findings at the next meeting.

Concepts that apply to all work plans

- Public outreach--the greater the public knowledge and involvement, the more successful the program will be.
- Policy Objectives:
- Promoting industry growth and monitoring activities go hand-in-hand.
- ASME certification legislation
- Contingency plans for salvage operations – to deal with diseased forests
- Current use/use value appraisal
 - This is likely to be modified soon by the legislature
 - The group agrees that the Use Value Appraisal program is an integral part of maintaining a forested landscape and promoting growth of forest industries, the disagreement is in how changes to the program will affect enrollment of forest lands.

Future Meetings

Next meeting: Presentation of interim report and case studies to the legislature. (Joint Nat. Res. and Ag. committees) – Wed. 1/20/10 9-11:30am Rm. 11 State House

- Subcommittees to present the different work plans
- Case studies to follow

Next full working group meeting – Monday, February 8, 2010 1-4pm @ the statehouse

BioE: Biomass Energy Development Working Group

MINUTES for Tuesday, March 16, 2010

1:00pm – 4:00pm

Room 410, Tax Building 166 State St.

MEMBERS PRESENT: Rep. Chris Bray, Rocky Bunnell, Jamey Fidel, Ehrhard Frost, Bill Kropelin, Ben Machin, Chris Recchia, Sec. Jonathan Wood, Bill Keeton, Kelly Launder, Robert Turner.

MEMBERS NOT PRESENT: Sen. Ginny Lyons, Peter Condaxis, Paul Cate, Sam Miller

STAFF PRESENT: Leg. Counsel Intern Graham Leitner, Asst. Catherine Russell

Convened

Co-Chair Rep. Chris Bray convened the working group.

Old Business: No minutes to approve from last meeting. Review of last month's meeting regarding modeling and discussion of forest health.

New Business: Change of location for the next meeting. The new location will be the Governor's Conference room in the Pavilion Building.

Subcommittee Presentations:

Forest Health Subcommittee – Bill Kropelin

- A look at past Vermont harvesting data and current harvesting guidelines from various states.
 - “Report on Chip Harvester Operations in Vermont, 1990” (see report)
 - Compare Burlington Electric Department's (BED) harvesting policies to that of other Midwestern and Eastern states (see chart and BED policies)
 - In-house policies at BED monitoring costs \$1-2/ton of material
- Discussion of Biomass Guidelines
 - Third party certification could provide monitoring and standards that would ensure good forest practices
 - Good forestry practices would build public support for biomass energy and industry
 - The Forest Guild has been working on recommendations for biomass harvesting guidelines that should be finished by next meeting
 - Components: density of debris (# pieces/acre coarse woody debris vs. mass/acre), Forest Guild is working on across the board indicators of stand health specific to forest stand development conditions

Modeling Subcommittee:

- BERC is completing the Forest Inventory Analysis (FIA)
 - FIA uses the same counties as previous study

- Report can be complete by next meeting
 - Harvesting data is collected by county, whereas available biomass will be more site specific

Enhancement and Development Subcommittee – Chris Recchia

Basic Principals

- Facilities in this region seek to switch from oil to wood
 - Municipalities, schools, hospitals, homes, etc.
 - Outreach to facilities with the potential to convert to renewable heat and cogeneration systems
- One or more new electric facilities (25-50 MW)
 - Southern part of the state has excess supply of biomass
 - Citing of a facility is resource driven, not demand driven. 50 MW is not a significant portion of the electric demand of the state
- State Energy Plan (see pie chart)
 - Additional 1,000,000 tons of in-state harvest will only provide 1-2% of Vermont’s energy (heat and electric)
 - What are state incentives/disincentives?
 - Invite VEDA to committee
 - Use of municipal bonds – if you get public support, people will invest
 - Energy Czar – not popular, not efficient
 - Overused at federal level
 - Need for information dissemination, not a policy driver
- Green Energy Program (Clean Energy Development Fund)
 - Green zones (Montpelier/Randolph district heating plans require 3rd party certification to qualify)
 - Vermont is looking to build “green energy” infrastructure
- Questions to answer(sequential)
 - Find out how much wood?
 - What type of infrastructure do we want to invest in? (electric vs. thermal vs. cogeneration)
 - Decide where to provide incentives?

Discussion:

- What type of industry should the state promote?

- Choose the best, most sustainable uses: local, useful, best practices, combined heat and power
- Year round markets to avoid seasonal fluctuations in biomass industry
- Citing considerations
 - CHP systems should be located where heat can be utilized (urban areas)
- What are incentives for CHP?
 - Current policy and incentives are for electricity production
 - Tax credits for production and investments
 - No thermal incentives beyond those provided by the Clean Energy Development Fund

For Next Time:

- Discussion of Procurement vs. Harvesting Guidelines
- Each member to bring in outside information
- ANR to provide facilitator
- Attempt to form consensus on moving forward on development of standards to protect forest health

Schedule for upcoming meetings:

- Tuesday, April 13th – Pavilion Building
- Monday, May 17th
- Thursday, June 10th

BioE: Biomass Energy Development Working Group
 MINUTES for Tuesday, April 13, 2010
 1:00pm – 4:00pm
 4th Floor Conference Room, Pavilion Building, Montpelier, VT

MEMBERS PRESENT: Rep. Chris Bray, Rocky Bunnell, Jamey Fidel, Ehrhard Frost, Bill Kropelin, Ben Machin, Chris Recchia, Sec. Jonathan Wood, Bill Keeton, , Robert Turner, Peter Condaxis, Paul Cate, Sam Miller.

MEMBERS NOT PRESENT: Sen. Ginny Lyons, Kelly Launder

STAFF PRESENT: Leg. Counsel Intern Graham Leitner, Asst. Catherine Russell, Ed O’Leary, Department of Forests, Parks, and Recreation

Convened

Co-Chair Rep. Chris Bray convened the working group.

Old Business:

- Motion to Approve last month’s minutes with minor revisions – Chris Recchia, 2nd – Bill Kropelin

New Business:

- Confirm dates for next meetings (May and June) – Catherine Russell to reserve rooms.
- Announcement by Graham Leitner regarding participation in working group to fulfill requirements for a Vermont Law School George Perkins Marsh Fellowship. Graham will be working with Michael O’Grady and the Bio-E Working Group over the summer to help draft the group’s recommendations and report to the Legislature.
- Announcement of Middlebury Biomass facility tour. Bio-E group would like to tour the facility and speak with staff regarding procurement standard development and hold our July meeting at the Middlebury campus.

Hand-out:

1. *Biomass Procurement at Middlebury College: Assessments and Recommendations* - Environmental Studies Senior Seminar, Middlebury College Fall 2009

Subcommittee Presentations:

Forest Health Subcommittee

Hand-outs:

1. *Elements of a Wood Procurement Standard* – Bill Kropelin
2. *Summary of the Forest Guild’s Forest Biomass Retention and Harvesting Guidelines* – Ehrhard Frost
3. *Environmental factors in woodfuel production: Opportunities, risks, and criteria and indicators for sustainable practices* (B. Lattimore, C.T. Smith, B.D. Titus, I. Stupak, G. Egnell) – via Bill Keeton

4. *Promoting Ecological Sustainability in Woody Biomass Harvesting* (Maria K. Janowiak and Christopher R. Webster) – via Bill Keeton

Modeling Subcommittee

No new business

Enhancement and Development Subcommittee

No new business

Facilitated Negotiation

- The topic for April’s meeting is Procurement Standard vs. Harvesting Guidelines. Ed O’Leary has been asked to join the group for today’s meeting as a facilitator to guide the discussion.
- Definitions:
 - *Procurement Standard*: These are purchasing requirements that a facility must adhere to when purchasing biomass materials. They ensure that materials are sourced according to certain standards. One element of the procurement standard might be harvesting guidelines. Procurement standards may be voluntary or compulsory.
 - *Harvesting Standards*: These guide what happens in the field. They ensure that certain practices are followed by foresters, loggers, and/or landowners when harvesting biomass. The main purpose of harvesting guidelines should be to ensure that certain aspects of forest health are protected. They may be voluntary or compulsory.
- The voluntary vs. compulsory nature of procurement standards or harvesting guidelines was not part of the discussion, even though this may be important to the outcome. Instead, the focus was on listing the pros and cons of each.
- To begin the discussion, each member of the group was asked to spend five minutes listing the pros and cons of both Procurement Standards and Harvesting Guidelines.
- Next, all pros and cons were listed on white boards at the front of the room – approximately 30 minutes were spend listing pros and cons for each type of standard.
- Consideration of pros and cons: group was asked to hot dot five *cons* for each type of standard that had the potential to halt the development of that standard.
 - Issues that are most controversial:
 - Procurement Standards:**
 1. Cost to state
 2. Inconsistent with other state programs (for biomass harvests)
 3. Complexity for field foresters
 - Harvesting Guidelines:**
 1. Regional consistency
 2. Monitoring and Enforcement in difficult and expensive
 3. Divisive to forest industry

BioE: Biomass Energy Development Working Group
 MINUTES for Wed., June 10, 2010
 1:00 p.m. – 4:00 p.m.
 Room 10, State House, Montpelier, Vermont

Members Present: Rep. Chris Bray (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Jamey Fidel, Ehrhard Frost, Bill Kropelin, Sam Miller, Robert Turner

Members Not Present: Bill Keeton, Kelly Launder, Sen. Ginny Lyons, Ben Machin, Chris Recchia, Sec. Jonathan Wood (co-chair)

Staff Present: Aaron Adler (Legislative Counsel), Graham Leitner (Intern, Leg. Council)

Others Present: Barbara Burns (DFPR), Bob DeGeus (DFPR), Sandy Wilmot (DFPR), Adam Sherman (BERC), Sarah Galbraith (BERC)

MINUTES:

Co-chair Rep. Bray convened the meeting. The minutes of May 17, 2010 were approved.

Barbara Burns and Sandy Wilmot of the Department of Forests, Parks and Recreation (DFPR) made a presentation on forest health and DFPR activities on forest health, including a power point. Following the presentation, the working group discussed DFPR's role and activities related to data-gathering and promoting forest health.

The working group then discussed draft biomass harvesting guidelines produced by the Forest Health (FH) subcommittee.

There was no report from the modeling committee. A. Sherman reported that BERC is moving to complete the basic update and refine relevant data sets.

The working group then discussed the written report of the enhancement and development working group dated June 10, 2010, including possibly adding an ad hoc working group member with knowledge of development and energy issues. B. DeGeus suggested contacting Alex Ibey, which P. Condaxis volunteered to do.

J. Fidel reported on the ongoing public forums sponsored by BERC, VNRC and others.

NEXT MEETINGS:

July 20, 2-6 p.m. – Middlebury College, information to be distributed by G. Leitner.

August 17, 1 – 4 p.m. – Montpelier, location TBA.

September 16, 1 – 4 p.m., Montpelier location TBA.

BioE: Biomass Energy Development Working Group
MINUTES for Tues., July 20, 2010
2:00 p.m. – 6:00 p.m.
Middlebury College, Middlebury, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Bill Kropelin, Sen. Ginny Lyons, Ben Machin, Sam Miller, Robert Turner

Members Not Present: Jamey Fidel, Ehrhard Frost, Bill Keeton, Kelly Launder,
Staff Present: Aaron Adler (Legislative Counsel), Michael O’Grady (Legislative Counsel), Catherine Russell (Committee Assistance)

MINUTES:

Co-chairs Rep. Bray and Sec. Wood convened the working group.

The working group visited sites at Middlebury College related to the College’s use of woody biomass to produce heat and electricity. The group visited willow groves that the College planted to provide fuel. The group then toured the College’s power plant, viewing the equipment in the plant related to fuel intake and biomass energy production.

The working group then met at the College’s Franklin Environmental Center.

During this meeting, the working group discussed the following topics:

1. Draft biomass harvesting guidelines produced by the Forest Health subcommittee.
2. Public forums sponsored by the Biomass Energy Resource Center, Vermont Natural Resources Council and others and the relationship of the forums to the group’s work.
3. The Biomass Sustainability and Carbon Policy Study prepared by the Manomet Center for Conservation Sciences for the Massachusetts Department of Energy Resources.
4. Preparation of the working group’s interim report due later this year. Directions were given to the subcommittees to move forward with their reports for discussion by the full group and potential inclusion in the interim report.
5. Scheduling of future meetings.

No formal actions were taken by the working group during the meeting. The group adjourned the meeting at approximately 6:00 p.m.

BioE: Biomass Energy Development Working Group
MINUTES for Tues., Aug. 17, 2010
1:00 p.m. – 4:00 p.m.
Room 11, State House, Montpelier, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Jamey Fidel, Ehrhard Frost, Bill Keeton, Bill Kropelin, Sam Miller, Robert Turner

Members Not Present: Kelly Launder, Sen. Ginny Lyons, Ben Machin, Chris Recchia,

Staff Present: Mike O'Grady (Legislative Counsel)

Others Present: Adam Sherman (BERC)

MINUTES:

Co-chair Rep. Bray convened the meeting. The minutes of July , 2010 were not yet complete, and the group passed over approval of the minutes of the previous meeting.

Pat Bartlett, a consulting forester and wildlife management consultant for Bartlett Forestry and Wildlife, presented a video to the group regarding whole tree harvesting for biomass energy production. Mr. Bartlett discussed the economics of whole tree harvests for biomass energy production. Mr. Bartlett also discussed the forest health and animal habitat benefits of whole tree harvests. In addition, Mr. Bartlett recommended that foresters and loggers complete a workshop regarding the proper planning and layout of a harvest site in order to maximize harvest and reduce cost. Mr. Bartlett also recommended newspaper notification and other community notifications of upcoming whole tree harvests for biomass.

The working group then discussed the work of the working group subcommittees.

Peter Condaxis of the development and enhancement subcommittee stated that due to recently revised wood supply estimates, the subcommittee needed to revise the proposals of the subcommittee. The revised proposal will be presented to the group at the September meeting.

Ehrhard Frost of the Forest Health Subcommittee presented to the group the revised Recommended Guideline for Maintaining Water Quality, Soil Productivity and Biological Diversity on Harvesting Jobs in Vermont (previously titled Recommended Woody Biomass Retention Guidelines). The group discussed a new guideline advising that whole tree harvesting be avoided on low-nutrient sites as well as steep slopes and erosion prone sites. The group recognized that consideration of this concept and its underlying rationale is worthwhile, but the language may need to be revised in order to address concerns of group members and to make the guideline workable for foresters and loggers. Suggested edits of the language will be sent to Bill Kropelin for potential revision by the Forest Health Subcommittee.

Jamey Fidel of the Forest Health Subcommittee then circulated notes with preliminary proposals from the subcommittee addressing each of the issues set forth in Act No. 37 of the 2009 Session that the subcommittee is charged with addressing. The working group reviewed the notes and agreed that they were helpful, but significant additional time was necessary for group discussion of the proposals. Time will be scheduled for this discussion at the September meeting.

Robert Turner of the Modeling Subcommittee reported that BERC will issue in October the revised Vermont Wood Fuel Supply Model contracted for by Department of Forests Parks and Recreation. The group discussed preliminary results of the BERC revision and the fact that the U.S. Forest Service Forest Inventory and Analysis (FIA) from 1997 overestimated the forest inventory in Vermont.

Michael O'Grady then discussed with the working group the format and schedule for the second interim report of the group. A preliminary draft of the second interim report will be presented to the group at the September meeting.

The group then rescheduled the September meeting to Sept. 9, from 9:00 a.m. until 3:00 p.m. in Room 10 of the State House.

J. Fidel reported on support for additional public forums on biomass use and development in Vermont.

NEXT MEETINGS:

September 9, 9:00 a.m. – 3:00 p.m., Montpelier, State House Room 10.

BioE: Biomass Energy Development Working Group
MINUTES for Fri., Oct. 8, 2010
10:00 a.m. – 4:00 p.m.
Room 10, State House, Montpelier, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Jamey Fidel, Ehrhard Frost, Bill Keeton, Bill Kropelin, Sen. Ginny Lyons (by phone), Ben Machin, Sam Miller, Chris Recchia

Not Present: Robert Turner

Staff Present: Michael O’Grady (Legislative Counsel), Aaron Adler (Legislative Counsel), Catherine Russell (Committee Assistance), Rosalind Daniels (Committee Assistance)

MINUTES:

Co-chairs Rep. Bray and Sec. Wood convened the working group.

The working group approved the minutes of its July 20, 2010 meeting with the following revision: The phrase “harvest land site size” is changed to “landing size.”

The working group approved the minutes of its August 17, 2010 meeting with the following revision: In the paragraph beginning “Ehrhard Frost of the Forest Health Subcommittee presented,” third sentence, strike the phrase: “The group recognized that consideration of this concept and its underlying rationale is worthwhile, but” and keep the remainder of the sentence.

The working group reviewed and discussed the preliminary draft of its second interim report prepared at its request by legislative counsel. The working group made various changes to the draft interim report during the meeting. The working group also directed legislative counsel to make other changes for which counsel would suggest draft language for review by the working group at the next meeting.

On the draft report, the working group set up the following process and schedule. Members will provide legislative counsel with further comments and information by October 13, 2010 and legislative counsel will circulate a revised draft by October 15, 2010. In the revised draft, legislative counsel will highlight all changes made, noting the source of each change.

Co-chair Rep. Bray identified several possible topics for the working group’s future consideration, including:

- The status of the comprehensive energy plan prepared by the Department of Public Service and the relationship of the working group’s reports and work to that plan.
- Draft legislation to enable municipalities to establish heating districts.
- The relationship of the working group’s reports and work to the 25 by 25 initiative endorsed by resolution of the General Assembly (R-409 of the 2005-06 biennium).

- Research into how to account for and quantify the carbon impacts of using woody biomass for energy production.
- Alternative funding sources to support energy production from woody biomass.
- Presentation by member Bill Keeton on harvesting.

Legislative counsel provided the members with copies of the biomass section of the Department's current draft comprehensive energy plan.

The working group discussed future scheduling. In addition to the schedule discussed above for revisions to the draft report, the working group will hold its next meeting at the State House on November 8, 2010 starting at 1:00 p.m. and will convene a public hearing on the draft interim report on November 30, 2010 from 7:00 to 8:30 p.m., location to be determined.

The meeting adjourned at approximately 4:00 p.m.

BioE: Biomass Energy Development Working Group
MINUTES for Mon., Nov. 8, 2010
1:00 p.m. – 4:00 p.m.
Room 11, State House, Montpelier, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Peter Condaxis, Jamey Fidel, Ehrhard Frost, , Bill Kropelin, Sam Miller, Chris Recchia

Not Present: Paul Cate, Bill Keeton, Sen. Ginny Lyons, Ben Machin, Robert Turner

Staff Present: Michael O’Grady (Legislative Counsel), Aaron Adler (Legislative Counsel), Catherine Russell (Committee Assistance), Rosalind Daniels (Committee Assistance)

MINUTES:

Sec. Wood convened the working group. Co-chair Rep. Bray arrived later due to weather.

The working group approved the minutes of its Oct. 8, 2010 meeting.

The working group discussed additional issues or news that the group should address in the future, including wood pellet content.

The working group reviewed the group’s schedule and the process for review and final approval of the draft second interim report. The group discussed the location and process for the scheduled public meeting on Nov. 30. The group also scheduled a meeting on December 15, 2010 to review and respond to the comments from the public meeting. A tentative meeting was also scheduled for January 10 if additional revision of the report is required.

The working group then reviewed and edited the draft second interim report. Michael O’Grady of Legislative Council reviewed the Modeling Subcommittee recommendations, to which the working group made edits. Michael O’Grady then reviewed the Forest Health subcommittee recommendation, to which the working group made edits. Aaron Adler of Legislative Council reviewed the recommendation of the Enhancement and Development subcommittee, to which the working group made edits.

The working group next voted to approve the recommendations of the Forest Health and Enhancement and Development subcommittees as recommendations of the full working group. The recommendations of the Modeling subcommittee had previously been approved as group recommendations.

The working group concluded with a brief discussion of additional issues to address at future meetings.

The meeting adjourned at approximately 4:15 p.m.

MINUTES for Tues., Nov. 30, 2010
7:00 p.m. – 8:45 p.m.
Red School House Conference Room
Vermont Technical College, Randolph, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Bill Keeton, Jamey Fidel, Ehrhard Frost, Bill Kropelin, Ben Machin, Sam Miller, Chris Recchia, Robert Turner

Not Present: Sen. Ginny Lyons

Staff Present: Michael O’Grady (Legislative Counsel), Aaron Adler (Legislative Counsel), Catherine Russell (Committee Assistance), Katie McLinn (Intern, Legislative Council)

MINUTES:

The Working Group convened a public hearing at 7:00 p.m. on its draft interim report to be submitted by January 15, 2011 to the general assembly. Citizens who attended and completed a “sign-up” sheet are on the attached list. A summary of the comments made during the hearing is available at this link:

http://www.leg.state.vt.us/WorkGroups/BioMass/BioE_oral_public_comment_summary_11-30-10_public_hearing.pdf

The hearing followed the following schedule:

- a. Call to order, welcome, and description of the evening’s agenda and format by Co-chair Rep. Bray.
- b. Summary of the act creating the Working Group, the Group’s activities to date, and the draft interim report by Counsel O’Grady.
- c. Brief presentations by Working Group members to introduce each of four break-out sessions scheduled to occur: wood supply modeling (Turner), enhancement and development of woody biomass (Condaxis), maintaining forest health (Kropelin), and general comments (Co-chair Sec. Wood).
- d. Break-out sessions for each of the areas described in c, immediately above. During this period, groups of attendees gathered in separate locations set up for each of those areas, with a laptop and easel at each location on which comments raised by members of the public were recorded.
- e. A reconvened session of the full Working Group, during which the comments recorded on easel paper were displayed for the full group and all attendees. A member of the Group reported the comments made during each of the break-out sessions: wood supply modeling (Turner), enhancement and development (Recchia), forest health (Fidel), and general comments (Co-chair Sec. Wood). The Working Group then heard additional comments from members of the public.

During the hearing, the Working Group informed those attending that written comments on the draft interim 2011 report could be submitted through December 7, 2010 and advised them that the Working Group planned to meet to discuss the comments on the draft report and any changes to the report on December 15, 2010 and, if necessary, on January 10, 2010, and to submit the interim report to the general assembly by January 15, 2010. They were also informed that the interim report will include, as appendices, a summary of the oral comments from the November 30 hearing and the written comments received by December 7.

The meeting adjourned at approximately 8:45 p.m.

Attachment: List of attending citizens

**ATTENDEES, 11-30-10 PUBLIC HEARING
BIOMASS ENERGY DEVELOPMENT WORKING GROUP**

Except for the members of the Biomass Energy Development Working Group and its staff assistants, below are listed the names of those who attended the Working Group's public hearing on November 30, 2010 at Vermont Technical College in Randolph, Vermont and who listed their names on a "sign-up" sheet.

John Bethune
Carl Bielenberg
Jon Binhammer
Gaelan Brown
Heath Bunnell
Donna Barlow Casey
John Clark
Matt Colburn
Marc DiMario
Al Floyd
David Frank
Harold Garabedian
Peter Gill
Steve Hardy
Robbo Holleran
Ann Ingerson
Grahm Leitner
Abe Lewis
Tim Maker
Chris Matera
Anthony Mennona
Edith Pike-Biegunska
Frank Reed
Joan Richmond-Hall
Josh Schlossberg
Adam Sherman
Rich Turner
Dan Young

BioE: Biomass Energy Development Working Group
MINUTES for Wed., Dec. 15, 2010
1:00 p.m. – 4:00p.m.
Room 11, State House
Montpelier, Vermont

Members Present: Rep. Chris Bray (co-chair), Sec. Jonathan Wood (co-chair), Rocky Bunnell, Paul Cate, Peter Condaxis, Bill Keeton (by phone), Jamey Fidel, Ehrhard Frost, Bill Kropelin, Sen. Ginny Lyons, Chris Recchia, Robert Turner

Not Present: Ben Machin, Sam Miller

Staff Present: Michael O’Grady (Legislative Counsel), Aaron Adler (Legislative Counsel), Catherine Russell (Committee Assistance)

MINUTES:

The Working Group approved the minutes of its meetings of November 8, 2010 and November 30, 2010, with the direction that legislative counsel add to the November 30 minutes a web link to the summary of oral comments received at that meeting on the draft interim report to be submitted by January 15, 2011 to the general assembly

The Working Group discussed oral and written comments received on that draft report and the possibility of changes to the draft.

During the meeting, the Working Group created a list of issues potentially to be addressed by the group during the upcoming year, without deciding whether to include these issues in its future work. The listed issues included consideration of biochar, impacts of biomass energy use on public health, the relationship of the group’s work to the state energy plan, carbon impacts of biomass energy generation, use of roundwood, management of forest resources, the extent to which existing regulatory processes include review of a project’s impacts on the woodshed, the enhancement of existing activities that use biomass to produce energy, and consideration of short rotation woody crops.

The Working Group did not decide whether to make any changes to the draft report. Instead, the members agreed that by December 24, 2010 they would each prepare any proposed comments and changes to the report, to be circulated to the Working Group for consideration at its next meeting.

The Working Group decided to schedule its next meeting for January 4, 2010.

The Working Group adjourned its meeting at approximately 4:00 p.m.

Appendix C. Identified Forest Monitoring Activities in Vermont

Forest Inventory and Analysis. This inventory is a cooperative effort of the USDA Forest Service and the Vermont Department of Forests, Parks & Recreation that provide periodic information on forests of the state. Aerial photography and long-term monitoring plots provide estimates of forest area by forest type and stand-size class, numbers of trees by species, biomass (and carbon), timber volume, growth and change.

Forest Health Monitoring. A subset of the FIA ground plots are measured for additional forest health indicators: down woody material, lichen communities, ozone bioindicator plants, crown condition, and soil characteristics.

Vermont Hardwood Health Survey. Aerial color infrared photography and permanent ground plots were established in 1985-1986 to assess the condition of the hardwood resource in Vermont, which at the time had significant decline and mortality. This survey was repeated every 5 years for 15 years, and is currently on hold. In 2001, the abundance of non-native invasive plants was added to the survey.

North American Maple Project. Vermont plots established in 1988 are visited annually to monitor sugar maple tree health, compare sugarbush management with non-sugarbush forests, and to evaluate conditions according to various levels of acid deposition. Recently, data are collected on non-native plant abundance on plots.

Vermont Monitoring Cooperative. Established in 1990 as a State, University and Federal partnership, the VMC conducts monitoring and research of Vermont's forested ecosystems involving cooperation from many other organizations and individuals. Ecological data are conducted at 2 intensive study sites at Mount Mansfield and the Lye Brook Wilderness area of the Green Mountain National Forest. Monitoring of weather, air quality, forest conditions, soil characteristics, flora and fauna diversity, water quality, and forest management contribute to understanding, managing and protecting our forest ecosystems.

Annual aerial survey. Flight lines covering the entire state are used to detect areas of forest damage. These maps provide an assessment of current forest conditions and impacts of insect, disease, weather events, and other causes.

Ground monitoring plots. Insect traps are used to detect population changes of major forest pests (e.g. gypsy moth, forest tent caterpillar) and monitor forest impacts. Surveys are also used for early detection of new non-native pests as they may be transported into the state (e.g. hemlock woolly adelgid, asian longhorned beetle).

Other sources of data. Other federal, state and private organizations provide forest-related data that is used periodically by the Department to assess forest health: Agency of Natural Resources Dept. of Fish and Wildlife, Water Quality Division, and Air Pollution Control Division; US Geological Survey, Natural Resource Conservation Service, Agency of Agriculture, State Climatologist at UVM, National Oceanic and Aeronautics Administration, Environmental Protection Agency, The Nature Conservancy, Vermont Land Trust, and individual researchers.

Provided by Sandy Wilmot, Forest Health Specialist, Dept. Forests, Parks & Recreation. Oct. 16, 2009

Appendix D. Biomass Energy Development Working Group Summary of Comments, Public Hearing, Nov. 30, 2010

This document is a summary of comments received by the Biomass Energy Development Working Group (the Working Group) during its public hearing in Randolph, Vermont on November 30, 2010. The comments are organized according to the hearing's format, which included "break-out" sessions into four groups: general, modeling, enhancement and development, and forest health. The comments for each group are summarized below, followed by a summary of comments received during a reconvened session of the full committee that occurred after the break-out sessions.

The comments below do not necessarily reflect a consensus reached among each break-out group or during the reconvened full committee session. The purpose of the break-out and full committee sessions was to hear all comments rather than to build consensus. Comments included below are those that were made regardless of whether all persons in a group agreed with them.

1. General group

The air pollution issue is not big biomass plants but the increase in numerous small ones (e.g., schools, home heating appliances). There are not enough air quality controls for small sources. For large sources, there are more controls in place, more control technology available, and regulators have more familiarity with the technology.

Promoting small uses of wood pellets with current technology will increase the threat to human health and could have cumulative health effects.

Institute a moratorium on new plants until the working group is finished. New plants are coming on fast and would use more supply than is projected to be available in Vermont.

There is a problem with the disposal of wood ash, including particularly its use in farming as a soil amendment: Wood ash includes radioactive material (e.g., cesium-137 above background levels) and heavy metals.

Is the cart before the horse? The decision seems to have been made to increase burning biomass before studying the issue to see if it is a good idea to promote that increase after looking at health and environmental impacts.

Increased use of biomass, including for energy production, is not a new issue. It has been looked at for many years.

There should be an investment tax credit for logging contractors.

We need more markets for wood chips.

The working group should review woody biomass energy production (electrical and heating) for carbon impacts and compare those impacts to fossil fuels and other renewable energy sources.

The working group's composition is not balanced. Most of the members have a vested interest in increased logging and biomass burning. The working group needs to have people with expertise in public health, soil scientists, and biology.

Many of the issues raised by the above comments are already addressed elsewhere.

The report's recommendations should have more teeth. The report proposes voluntary rather than mandatory forest health guidelines and lacks a proposal for mandatory procurement standards. In Sec. C.2 of the draft interim report, concerning procurement standards, the working group proposes to answer all of the questions posed to it by the general assembly in the negative, with one exception: It says "yes" to regional procurement standards, a goal which is not in Vermont's control.

Insurance rates for foresters are too high.

2. Modeling group

Intensive model scenario is only 10 percent of net annual growth – is this too conservative – why was 10 percent chosen?

Need to look at the series of assumptions that go into any analysis.

What are we trying to figure out with this modeling and why do we need to know it?

So many issues – where to begin with modeling?

Need a series of numbers from a series of key assumptions/scenarios.

Need to capture GHG emissions in such a model.

The report (modeling) section really does not address the main goal of the modeling effort and needs to provide better context.

Need to retro model how our forests have changed over the last 50 years.

How do we make decisions about the allocation of the resource we are modeling?

Can we model factors such as symbiotic relationships between large and small facilities to secure supply?

3. Enhancement and development group

Large woody biomass power generation plants cannot achieve a 50 percent efficiency level; Vermont's large wood generation plant is only 25 percent efficient.

The report has no discussion of global climate change (e.g., less rain means less timber production). Also, carbon sequestration is not discussed. The report does not look at reducing the carbon dioxide level at all.

The report does not look at other means of using biomass like pyrolysis or methane generation.

There is no conceivable way to get to a 50 percent efficiency level for a large plant because there is insufficient thermal load. The group should require a 50 percent efficiency level or higher, rather than the report's proposal to have the Public Service Board require optimization of fuel efficiency, and should encourage smaller facilities that can meet this level rather than large plants.

The report lacks an economic analysis. There is no quantification of cost-benefit. The cost-benefit analysis is very compelling for thermal but not compelling for power plants. The working group seems to have avoided an economic analysis in order to provide a balanced portfolio of technologies but including cost-benefit analysis would have provided a more realistic description. (Commenter offered to help committee with economic analysis.)

From an engineering perspective, there is a problem for a combined heat and power (CHP) facility that joins thermal with a large electric generating facility because the electric generation must discharge heat at a higher temperature than is appropriate for thermal application. Electric CHP may not be conducive to thermal use due to a loss in efficiency.

Of the three described growth areas, there is no compelling reason why Vermont should promote power generation at commercial scale. It's wrong to do a lot of a bad thing to do a little of a good thing. We cannot solve the Vermont Yankee problem with wood. There is an argument that all renewables are needed but the benefits of large-scale commercial generation from wood do not make it worth doing. We should look at all scales of renewables.

Some 200 plants are proposed for New England, but only one has been built because of the economics. If money is to be made, the money must be made at the appropriate scale. It's preferable to work at the smallest level, with the smallest procurement radius.

Residential thermal generation is not mentioned in the report. Fire wood/wood stove need is large and compelling. Bring more attention to this issue.

In large systems, there is an obvious ability to recoup all costs in a single job. At the smaller end of the scale, the amount of development necessary to recoup costs requires several jobs; no one wants to do that effort.

Two processes are important and need consideration: production of bio-char, and use of wood gas as fuel for fuel cell – the latter is being tested successfully now.

Any recommendations the committee can make towards residential incentives should be added to the report (e.g., channel Regional Greenhouse Gas Initiative money or other incentives to boost residential market).

4. Forest health group

Will there be a future focus on grasses?

Review the certification process in other states and how it works. How do Vermont's proposed harvesting guidelines compare to other states, notably New Hampshire?

Is there an ANR review of biomass harvests for the two biomass electric generation plants? Will the current review standards carry over to new facilities? Glaring omission that existing procurement policies are not implemented/recommended for new electric facilities. There should be nongame review of proposed harvest sites for biomass electric generation.

Harvesting guidelines are a good first step to get people thinking about how to conserve forest health on the landscape. In the next year, the group should look to incentivize the adoption or implementation of additional procurement standards in order to continue to raise the bar on forest health. Incentives could include financial incentives.

Need enforcement and control of harvesting. The guidelines need to be mandatory and enforceable.

Protecting deer herds is in conflict with hardwood forest regeneration. Re-evaluate as part of guidelines. Re-evaluate deer yard protocol in biomass harvesting.

Turkeys are also a problem with hardwood regeneration.

Any property enrolled in the use value appraisal program should be exempt from the ANR review under electric generation procurement policies

Certification may not address all areas of concerns. But if FSC used the harvesting guidelines recommended by the BioE group, it may help to mesh procurement and drive better results on the ground.

Third party certification is not a good idea, but if it is recommended, all certification programs should be utilized or approved.

5. Reconvened full committee

The preface to the report should include the history of biomass harvesting in Vermont and its impact in forest health.

The economics of the biomass harvesting and electric generation should be more closely studied.

Health concerns identified in subcommittee breakout groups apply to both large scale and small scale facilities.

There is an issue of scale. Small-scale facilities will encounter some of the same issues as large-scale facilities. Need to start with a balance in scale between enhancement and sustainability.

Need to look at BTU content of wood supply. It is an important aspect of an economic analysis of the sustainability of biomass electric generation. Green wood has lower BTU and decreases the efficiency of biomass electric generation.

**Appendix E: Biomass Energy Working Group Written Comments Received on Draft
Interim 2011 Report as of December 8, 2010**