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An Overview of Biomass Thermal Energy Policy Opportunities in the Northern Forest Region

Prepared for:
Northern Forest Center

Prepared by:

BERC
Renewable • Reliable • Resourceful
Biomass Energy Resource Center

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Support and feedback was provided by the members of the Northeast Biomass Thermal Working Group (NEBTWG). The views expressed in this report are those of the authors, consistent with the commissioning of this work as an independent study. For more information and to contact the study author:

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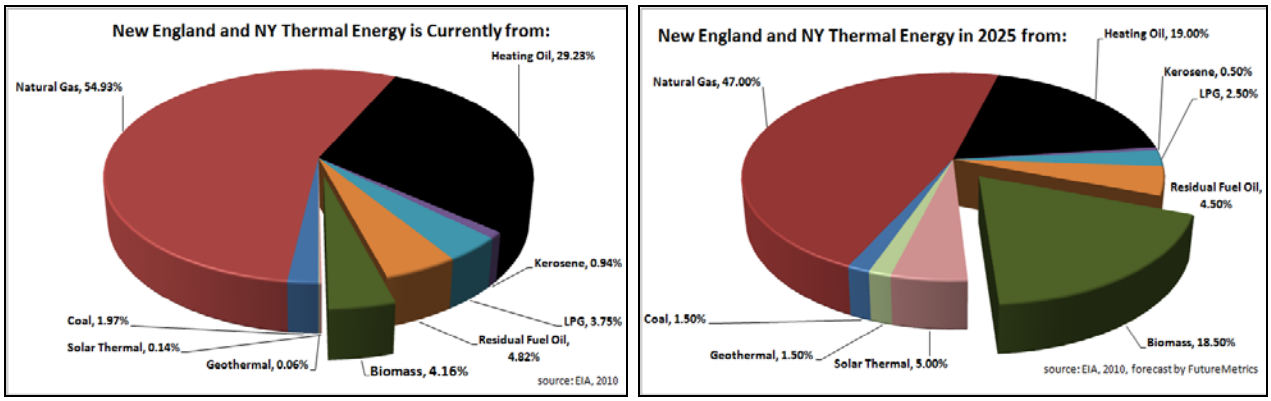
1.0 Introduction

The use of energy for space and water heating, referred to as thermal energy, accounts for roughly one third of the total energy consumed in the US and is supplied almost entirely by fossil fuels such as natural gas, propane and heating oil.[1] Over 4.4 billion gallons of heating oil are used annually in the Northeastern US alone, primarily for space heating. This accounts for approximately 86% of the national demand for heating oil.[2]

As the Northeast region looks to decrease reliance on imported fossil fuels used for heating, local biomass resources sourced from well-managed forests and farms have the potential to significantly reduce our dependence on heating oil, propane and natural gas and at the same time, provide a wide range of economic and environmental benefits.

Figure 1: Thermal Energy Composition by Fuel Type in 2010 and NEBTWG Goal for 2025



Many northeastern US states have recently established aggressive targets for renewable energy as a way to expedite the transition away from fossil fuels, with most of the targets focused on the use of renewable energy for electricity generation rather than for thermal energy or transportation. In an effort to stimulate more aggressive state targets for the use of biomass for thermal energy, a coalition of biomass thermal energy advocates, the Northeast Biomass Thermal Working Group (NEBTWG)[3], released a vision statement in 2010 calling for policies to grow the use of biomass energy from 4% of thermal energy demand to 18.5% of demand in the Northeast by 2025.[4] Referred to as "The Bold Vision," the report explains the basis for the 18.5% target and identifies the job creation and local economic benefits that could be achieved by 2025. However, to achieve such a target, immediate and dramatic

[1] http://www.eia.gov/totalenergy/data/annual/diagram1.cfm
[2] http://www.eia.gov
[3] NEBTWG is an informal network of biomass thermal advocates from New England, New York, Pennsylvania and Maryland. Started in 2008, NEBTWG's purpose is to identify and accelerate growth and adoption of biomass heating in the Northeast.
[4] http://nebioheat.com/pdf/heatne_vision_summary.pdf

change is needed for policies, regulations, and programs affecting the development and use of biomass thermal energy.

1.1 Study Objectives

Public policies and regulations at the state level can have a sudden and significant impact on the development of biomass thermal opportunities. State policy and regulation can help support the appropriate development and use of biomass thermal, or can directly (or inadvertently) result in significant market barriers that prevent or hold back market development.

This study was commissioned with the objective of developing model legislation that could be used to help inform future state-level policy initiatives that seek to advance the use of biomass thermal energy in the Northern Forest region. The primary focus of the study is on the four Northern Forest states of New York, Vermont, New Hampshire, and Maine. Information is also provided on other states (such as Massachusetts) when a state has been pursuing progressive policies affecting biomass thermal energy opportunities. The focus of the study is on policies and regulations affecting the development and use of systems fueled with solid biomass heating fuels such as chunkwood, pellets, and chips. Liquid biofuels (such as biodiesel) are not addressed.

The four key questions this study addresses include:

1. What policies and regulations are currently in effect in the Northern Forest region that affect development and use of biomass thermal energy and where are there gaps?
2. How have existing policies and/or regulations helped to advance or to hinder biomass thermal energy in the region?
3. What new policies are needed to advance biomass thermal energy? Has legislation been developed that can serve as model legislation for other states?
4. What are key next steps for advancing biomass thermal energy policy in the Northern Forest region?

This document identifies and assesses three major areas of policy affecting biomass thermal energy including legislative, regulatory, and financial policy. The report identifies key legislative, regulatory, and finance policies currently in place in the Northern Forest region that affect biomass thermal energy. Examples of biomass thermal legislation developed by others previously are provided and these are examined for their potential to serve as model legislation for others to implement in their own state in the future.

1.2 Study Partners

Northern Forest Center

This study was commissioned by the Northern Forest Center (NFC), a mission-driven non-profit organization that advocates for the Northern Forest region and helps its communities benefit from forest-based economic and conservation initiatives. Since it was founded, NFC has rallied people around a vision for the region's future that is built on three essential ingredients: thriving communities, healthy forests and innovative and resilient local economies that can support both. NFC plays a unique role as the only organization coordinating regional strategy across multiple interest areas—conservation, economic development and community development—in the four-state region. This enables NFC to amplify the work and voice of their partners, adding value to their work and advancing their shared goals. Funding for this study was

provided by the US Endowment for Forestry and Communities, as part of its four-year grant to the Northern Forest Center for the Northern Forest Investment Zone (NFIZ) initiative.

Biomass Energy Resource Center (BERC) at VEIC

The Biomass Energy Resource Center (BERC) is a program of the Vermont Energy Investment Corporation (VEIC), a national not-for-profit organization based in Burlington, Vermont working to reduce the economic and environmental impacts of energy use. BERC at VEIC works to advance community-scale biomass energy throughout North America through technical consulting, program design and implementation, and advocacy services. Since its inception in 2001, BERC has played a crucial role in increasing the quantity and quality of community-scale biomass energy projects in North America. BERC is a founding member of the Biomass Thermal Energy Council (BTEC), the national trade association for the biomass thermal industry, and of NEBTWG. BERC has played an active role in biomass thermal energy policy at the federal, regional and state levels and has participated in several previous studies conducted as part of the Northern Forest Investment Zone initiative.

2.0 State Renewable Energy Targets

Many states have established state-level targets for achieving specific levels of renewable energy by various dates in the future. Some states develop such targets through energy planning processes that result in aspirational renewable energy goals, but do not establish clear authority or mechanisms for achieving such goals. Other states enact such targets through legislation and/or regulation, and establish clear authority and mechanisms for achieving the goals. In some cases, state renewable energy targets specifically address biomass energy and/or biomass thermal opportunities while in other cases, the goal is stated more broadly. Presented below is the status of state renewable energy targets in each of the Northern Forest region states.

2.1 New York

In September of 2009, a law was passed establishing the New York State Energy Planning Board and requiring the board to develop a state energy plan. The *2009 New York State Energy Plan* called for at least 30% of renewable electricity by 2015 (sometimes referred to as '30 x 15').[5] In addition, the 2009 plan called for an 80% reduction in Greenhouse Gas (GHG) emissions by 2050. There is little in the 2009 plan that directly discusses thermal energy and resource-specific targets are not set for biomass energy (or other renewable resources such as solar, wind, or hydro).

New York is now working on the next version of the plan, referred to as the "2013 State Energy Plan." The planning process is being led by the State Energy Planning Board and will culminate in recommendations that, when implemented, will "help provide reliable, economical, and clean energy to New Yorkers."[6] It is unclear who will be responsible for achieving the goals and tasks to be identified in that plan.

In 2012, The New York State Energy Research and Development Authority (NYSERDA) launched an effort to develop a state-wide roadmap for developing the biomass thermal market in New York State. The purpose of the roadmap is to "assess critical technical, environmental, public health, economic, and policy issues related to biomass heating to provide a better understanding of the possible impacts and opportunities in New York State, and to provide the information in a format that will assist in the development of a responsible and economically viable biomass heating industry in New York State."[7] NYSERDA hired the Northeast States for Coordinated Air Use Management (NESCAUM) to lead the roadmap development. The roadmap is scheduled to be completed in early 2014.[8]

2.2 Vermont

Vermont recently published a state energy plan that addresses all forms of energy use - both electrical and thermal energy used in buildings as well as energy used for transportation. *Vermont's Energy Future – 2011 Comprehensive Energy Plan* calls for 90% of energy from

[5] http://www.nysenergyplan.com/
[6] Ibid.
[7] http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2329-Development-of-a-Biomass-Heating-Roadmap-for-New-York.aspx
[8] http://www.nescaum.org/documents/developing-a-biomass-heating-roadmap-for-new-york-state

renewables by 2050.[9] The report specifically states that the plan will need to be implemented by Vermonters broadly and that the governor's climate cabinet is tasked with monitoring progress toward the goals.[10] Biomass thermal is described in the plan as one way of helping to achieving the target but it is not specified how much biomass thermal is recommended for the state.

In 2012, the Vermont legislature passed Act 170 of 2012 that tasked the Vermont Department of Public Service with conducting a study to identify key policy options that could be pursued to achieve the state's renewable energy and carbon targets.[11] The study, conducted by the Regulatory Assistance Project (RAP), explored how various policy options (carbon tax, total energy standard, etc.) could encourage a broad range of energy efficiency and renewables—including biomass heating.

An additional study, the "Vermont Total Energy Study" is now underway and due to the legislature by December 15, 2013. The in-depth study, being conducted by Dunsky Consulting based in Montreal, will analyze and recommend specific energy policies options for achieving the renewable energy and GHG emission targets set in the *2011 Comprehensive Energy Plan*.

2.3 New Hampshire

In 2001, Governor Shaheen signed a bill charging the Office of Energy and Community Services (ECS) to develop a 10-year energy plan for the state. [12] The plan was completed in 2002 and has not since been updated or replaced with a more recent version. The 2002 plan established a baseline of New Hampshire energy needs and called for the creation of a Renewable Portfolio Standard (RPS) as well as for pursuing strategies to reduce dependence on foreign oil in the state. The plan did not directly address delivered fuels for heating.[13] Since 2002, an RPS was passed through legislation which sets the target of achieving 24.8% of electricity from renewable energy by 2025.[14] As part of its regulatory authority overseeing the electric industry in New Hampshire, NH Public Utility Commission (NH PUC) staff oversees implementation of the RPS. The RPS was modified in 2012 to allow renewable sources of thermal energy to qualify for Renewable Energy Certificates (RECs) developed as part of the implementation structure for the RPS.

2.4 Maine

Maine has one of the highest renewable energy standards in the nation, requiring through legislation originally enacted in 1997 that 40% of total retail electricity sales come from renewable resources by 2017.[15] There are no specific targets for renewable thermal energy included in the legislation. The Maine Energy Action plan subsequently developed calls for a reduction of oil use for electricity, heating, and transportation of by 50% by 2050.[16] The Governor's Energy Office is responsible for providing the leadership to achieve these targets. While transportation is a large percentage of oil (i.e. gasoline) consumption in Maine, heating is also a major component. Although weatherization, wider natural gas distribution, and other

[9] http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/CEP%20Overview%20Page_Final%5B1%5D.pdf
[10] Ibid.
[11] http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/TES/Total_Energy_Study_RFI_and_Framing_Report.pdf
[12] http://www.nh.gov/oep/resource-library/energy/documents/energy-plan-summary.pdf
[13] Ibid.
[14] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NH09R&ee=1
[15] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME01R
[16] http://maine.gov/energy/about/index.html

renewable energy will likely be a significant part of the strategy to meet this goal, biomass thermal could also have an important contributing role.

2.5 Massachusetts

Originally enacted with legislation passed in 1997, Massachusetts currently has both a RPS and an Alternative Portfolio Standard (APS) that apply to electric utilities serving the state. Implementation of the RPS and APS is overseen by the Department of Energy Resources (DOER).[17] The RPS sets a target of 15% 2020 for Class I new resources and increases 1% per year thereafter.[18] The APS provides businesses and institutions opportunity for incentives toward non-renewable energy measures (CHP, flywheel storage, and certain steam technologies) that would not otherwise qualify for REC under the traditional RPS. In 2010, the Massachusetts Agency of Energy and Environmental Affairs issued a report entitled, *Massachusetts Clean Energy and Climate Plan for 2020* in response to legislation calling for such a plan passed in 2008.[19] This plan called for considerable reductions in GHG emissions from the energy sector over 1990 levels by the year 2020 using a wide range of renewable energy sources, including biomass. The plan also called for an integrated portfolio of policies to achieve these targets.

2.6 Policy Opportunity for Biomass Thermal Energy

As noted above, all of the Northern Forest states (and Massachusetts) have clear goals for renewable energy in the electrical generation sectors and are moving forward with RPS policies (with the exception of Vermont) as a method to achieve the stated goals. Except for Vermont, none of the other Northern Forest states have comprehensive energy plans that directly address thermal energy and that set specific targets for thermal energy.

This indicates new opportunity exists for encouraging policy makers and regulators to proactively include thermal energy as part of the energy policies and strategies in place in a state, so that a more comprehensive approach is being used that addresses all uses of energy, not just electricity.[20]

As state renewable policies are being developed and specific targets are set for various forms of renewable energy (including thermal energy from biomass), it is vital that any specific targets be set with careful examination and consideration of the biomass resource potential. Numerous state government commissioned biomass resource quantification studies have been conducted over the past 10 to 20 years covering the Northern Forest states. Thus far, no states have gone as far as setting targets directly for the quantity of sustainable supply or to allocate the amount of biomass resource to different potential markets (i.e. electricity production, thermal energy, and transportation). [21,22,23,24]

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[17] http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA05R

[18] Ibid.

[19] http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan-summary.pdf

[20] This same opportunity exists for transportation-focused energy policy as well, which is not addressed in this study due to the focus on biomass thermal energy policy opportunities.

[21] http://www.biomasscenter.org/images/stories/VTWFSSUpdate2010_.pdf

[22] http://www.nyserda.ny.gov/Publications/Research-and-Development-Technical-Reports/Biomass-Reports/Renewable-Fuels-Roadmap.aspx

[23] http://www.maine.gov/doc/mfs/pubs/pdf/biomass_memo_071708.pdf

[24] http://www.mass.gov/eea/docs/doer/renewables/biomass/manomet-biomass-report-chapter3.pdf

3.0 Regulatory Policy Overview

Regulation can be a positive tool that allows industry to expand under a clear and predictable framework. It can also help demonstrate to the general public and the market place that a sector is mature and has the appropriate level of regulatory oversight. That said, regulation can also inadvertently hinder an industry and development of the market for that industry. Presented below is an overview of the key regulatory policies in place in each of the Northern Forest region states that affect development of the biomass thermal industry and market. This information is provided to help inform future regulatory policy activities in the region.

3.1 Forestry

Biomass used for fuel can come from various sources. This study is focused on the most common biomass fuel used for thermal energy—wood. Clean woody biomass used for making fuels such as chips and pellets can be automatically fed into heating appliances and are increasingly being sourced from commercial harvesting.

Presented in Table 1 is a summary of various forestry policies in each state related to forest ownership, management, and harvesting that affect the fuel supply chain for the biomass energy markets (including both biomass thermal and biomass electricity).

Table 1: State Policies Affecting the Fuel Supply Chain for Biomass Energy Markets

	Property Tax Incentives	Best Management Practices (BMP)	Heavy Cut Law	Forester Licensing	Logger Licensing	Biomass Harvesting Guidelines
New York	Program 480a	Recommended BMP	None	None	Voluntary training program	None
Vermont	Use Value Appraisal (UVA) Program	Voluntary AMP (Accepted Management Practices)	Permit required for heavy cut of 40 acres or more	None	Voluntary training program	Regulatory standards for power plants. General guidelines under development
New Hampshire	Current Use Program	Recommended BMP	Various minor rules	State license required	Voluntary training program	Guidelines in updated 2010 BMPs
Maine	Tree Growth Tax Law	Voluntary BMP	Forest Practices Act & Chapter 23 standards to eliminate liquidation harvesting	Required licensing	Voluntary training program	State recommended guidelines for biomass retention
Massachusetts	Forest Tax Law Program	BMP Manual	Forest Cutting Practices Act	Required licensing	License required	Requirements through APS eligibility

Nearly all states in the Northeast have tax policies that encourage private forestland owners to actively manage their forestland and periodically harvest timber. Public policies such as the "current use" property tax relief programs provide tremendous benefit to the entire forest

products industry and help sustain the working forested landscape in this region where a very large majority of forestland is privately owned. It is vital that these policies stay in place to continue to help ensure supply of wood fuel from well-managed forests in the face of patterns like forest parcelization and fragmentation.

Other policies such as best management practices and forest and logger licensing provide safeguards that help ensure that forests are responsibly managed and periodic harvesting is conducted in a manner that reduces potential adverse impacts. These policies also help send a signal to the general public and the market that forests are well managed and that increased demand for biomass heating will not over burden the forest or drive management toward unsustainable practices. Of course, the effectiveness of these policies to achieve the goals depends entirely on the details of how they are structured and implemented.

A recent Northeast (State) Foresters Association (NEFA) report reviews how select states have further adopted biomass harvesting guidelines, and examines the issues of how much biomass should be retained after harvesting to ensure long-term site productivity, biodiversity, and carbon storage.[25] These guidelines are designed to build upon the more general Best Management Practices (BMPs) which have historically aimed to protect water quality and wildlife habitat. Currently, Maine and New Hampshire have specific biomass retention guidelines incorporated into their broader BMP and several states are looking at adopting similar guidelines on a voluntary basis in the future.[26]

It is important for forestry guidelines to be adaptive, to be based in science, and to not put arbitrary constraints on silvicultural practices. It is equally important that clear systems be developed to indicate to the general public and a growing prospective biomass heating market that the forests will continue to be well managed and responsibly harvested.

3.2 Air Quality

Federal and state air emissions regulations for biomass combustion devices vary widely in terms of what is covered and how the systems are permitted and regulated. The standards are typically regulated by the type of system, fuel type, and system size. Historically, states in the Northeast have had widely differing air quality rules, ambient level thresholds for key pollutants, point-source emission limits, and permitting processes for biomass thermal energy systems. Of greatest concern to air quality regulators for wood combustion equipment are typically emission levels of particulate matter (PM).

Although, a large percentage of the biomass heating market is in the residential sector and smaller residential stoves and appliances have historically been where the highest emission rates occur, this sector is, for the most part, below the state level regulatory threshold when it comes to air quality. Despite the largely unregulated nature of the residential sector, the US

[25] http://www.nefainfo.org/NEFA%20Biomass%20BMP%20comparison%20Report%20FINAL%209.2012.pdf
[26] Ibid.

Environmental Protection Agency (EPA) has developed standards and combustion equipment certifications to help increase combustion efficiency and lower emissions.

One portion of the residential biomass thermal market that is experiencing state and even municipal regulations regarding air quality is the Outdoor Wood Boiler (OWB) market. Regulations for OWBs vary from state to state. Currently, all five states reviewed allow OWBs provided they meet EPA certification standards and follow specific guidelines in terms of stack heights and setbacks to neighbors, etc. However, several municipalities in Massachusetts currently ban the use of OWBs. Several states have programs to fund the change out/replacement of inefficient, polluting OWBs with more modern efficient options.

For the larger commercial and institutional boiler market there are widely varying permitting and emission thresholds from state to state. A summary is provided below in Table 2.

Table 2: Northeastern State Emissions Limits for Biomass Boilers[27]

State	Air Quality Permitting Threshold	Specific Limits for PM
New York	>1 MMBtu/hour output	0.6 pounds/MMBtu
Vermont	4.5 MMBtu/hour output	0.2 pounds /MMBtu and demonstrated use of BACT
New Hampshire	>2 MMBtu/hour output	0.3 pounds/MMBtu
Maine	10 MMBtu/hour output	Best Available Control Technology (BACT) determined on a case-by-case basis
Massachusetts	1 MMBtu/hour output	0.1 to 0.2 pounds/MMBtu

While there have been highly variable rules and emission limits from state to state, the new Federal EPA Maximum Achievable Control Technology (MACT) rules are moving toward greater consistency and may help move states toward greater consistency for larger boilers that fall under the MACT standards. Presented in Table 3 is a summary of the new EPA boiler rules based on the size of the boiler:

Table 3: Recently Adopted EPA MACT Rules for Biomass Boilers

Status	BTU Capacity	Boiler Technology	PM (lbs/MMBtu)	CO (ppm @7% O2)
Existing	>10MMBtu/hr	All technologies	N/A – Biannual tune-up required	
	< 10MMBtu/hr	All technologies	N/A – Biannual tune-up required	
New	>30MMBtu/hr	All technologies	0.03	N/A
	10-30MMBtu/hr	All technologies	0.07	N/A
	< 10MMBtu/hr	All technologies	N/A –Biannual tune-up required	

Each state has widely differing levels of ambient air quality and needs to be able to manage allowable point-source emissions based on good science specific to their ambient air quality situation. This results in some inconsistency in regulations across the Northern Forest region

[27] http://www.mass.gov/eea/docs/doer/renewables/biomass/doer-biomass-emissions-and-safety-regulations.pdf

and is experienced as a barrier to market entry by the biomass thermal industry. Industry representations suggest that even if emission limits vary, might the permitting thresholds at least be made more consistent? Eventually, as the biomass heating market grows, the industry matures, the fuels become more standardized, and the combustion equipment advances, it is hoped there will be less variability of the resulting emissions and air quality regulations and permitting will become more consistent and normalized regionally.

3.3 Boiler and Fire Safety

Different states have different boiler safety rules and fire codes. Historically, most states require boilers to be certified to the codes established by the American Society of Mechanical Engineers (ASME). ASME is a non-profit organization that sets industry standards that define the acceptable construction, inspection and testing of boilers and pressure vessels.[28] ASME standards for boiler safety are generic for all heating fuels—there are no specific standards for biomass systems.

Table 4: State Boiler Safety Requirements[29]

State	State Boiler Requirements[30]
New York	Requires ASME certified boilers primarily for public and commercial buildings. Local residential building codes regarding boiler certifications may vary.
Vermont	Vermont requires all boilers to meet ASME standards however in 2011 the rules were revised to allow boilers with either Canadian Standards Association or European Committee for Standardization certification only for boilers under 250,000 Btu/hour (input).[31]
New Hampshire	New Hampshire allows EN303-5 accredited boilers up to 300kWh (roughly 1.0 MMBtu/hr output) but requires everything else to be ASME stamped.[32]
Maine	Maine requires ASME boiler certification for public and commercial buildings. Local residential building codes regarding boiler certifications may vary.
Massachusetts	Massachusetts has the most restrictive requirements – they require ASME boiler certification for public, commercial, ***and residential*** buildings.

In the past four to five years, a few states have relaxed their state requirements for all boilers to carry ASME certifications and have recognized equivalent European or Canadian standards as an effort to see more high-efficiency, low emissions appliances from Europe installed. See Appendix C for a full copy of Vermont S.293 that changed the rules to allow European boiler safety certifications.

Several years ago, many European boiler manufacturers who were interested in selling in the US market had not achieved ASME certification and the state requirements were a considerable deterrent to attracting these manufacturers of modern, efficient biomass fueled heating systems to the US market. However, in the past few years an increasing number of

[28] http://files.asme.org/Catalog/Codes/PrintBook/34011.pdf
[29] http://www.mass.gov/eea/docs/doer/renewables/biomass/doer-biomass-emissions-and-safety-regulations.pdf
[30] Ibid.
[31] http://firesafety.vermont.gov/sites/firesafety/files/pdf/06FireCodeADOPTEDJune2009CORRECTED2011.pdf
[32] http://www.gencourt.state.nh.us/rules/state_agencies/lab1200.html

European pellet boiler manufacturers have gone through the process to achieve ASME certification for their systems and this no longer seems to be a critical issue preventing the import of the efficient and clean technologies manufactured in Europe.

There is a need for greater regional consistency for boiler safety standards which is not considered a critical barrier for the industry but rather an inconvenience. Perhaps the larger barrier associated with these standards is the issue of how the standards are enforced. Boiler safety standards are enforced by different agencies and departments from state to state. Most states rely predominantly on private-sector insurance inspectors to enforce state boiler safety codes for private buildings. Inconsistency in how and when the codes are enforced is reported repeatedly by industry representatives. Also reported is how private insurance companies and their inspectors view modern, bulk-fed, central biomass heating systems. Many insurance companies do not recognize centralized biomass heating systems as sole sources of heat in the same way as oil, propane or gas natural gas fired boilers or furnaces are, and this presents issues for homeowners seeking to secure mortgages with a centralized biomass heating system as its primary heat source.

3.4 Heat Sales

With the strong potential for more biomass district heating and companies offering large commercial or institutional customers delivered heat (instead of buying the boiler and fuel themselves), there is a certain level of ambiguity whether these new business models will fall under some level of state and/or federal regulation as energy "utilities." Centralized biomass district heating plants using modern, efficient, thermal energy delivery (piped hot water) function in the same way as electric utilities—instead of poles and wires delivering electricity, there are buried water pipes delivering heat to customers.

Heat sales and regulations for metering are important for several reasons. Selling heat is a core component of district heating. Second, selling heat is a new business model being offered by an increasing number of biomass thermal energy businesses. Rather than sell boilers and the fuel, they install their own boilers, provide the fuel and service, and sell the customer metered heat. Heat metering is an important part of heat sales and is a key ingredient in a thermal RPS policy and the delivery of thermal RECs.

In Vermont, biomass district heating is subject a wide array of state and local permitting—local zoning, state air quality permitting, state development permitting (Act 250), and Certificate of Public Good permitting (Act 248) if the project is a combined heat and power project (CHP) featuring grid interconnection. However, in Vermont there are currently no heat utility specific regulations similar to those applied to suppliers of electricity.[33] Currently, the biomass district heating project under way in Montpelier, Vermont has no regulatory oversight by the State of Vermont's Public Service Department (the department who regulates energy, telephone, and other utilities in the state).

In New Hampshire, Senate Bill 74 passed in the 2013 legislative session and that legislation exempts hot water district heating systems and their operators from being considered a "public utility" and as a result exempts the district heating system for New Hampshire PUC regulations.[34]

[33] http://www.biomasscenter.org/images/stories/District_Energy_Permitting.pdf
[34] http://www.gencourt.state.nh.us/legislation/2013/SB0074.html

At this time there is little need for regulatory oversight and control of heat metering and district heating as there is limited market activity. However, as this sector grows in the future, a certain level of regulatory oversight or perhaps industry standards may help provide consistency to project developers and develop public (and market) trust in the concept of buying thermal energy by the delivered Btu–not the fuel by the gallon or cubic foot. Ultimately, there is a need to demonstrate to the market place that district heating and metered contractual heat sales are a viable and trusted way to purchase energy. Some level of thoughtful and appropriate regulatory oversight or industry standards may help to achieve that.

4.0 Financial Policy Overview

A policy signal is sent on the extent to which a new or emerging market is being encouraged—in part based on the availability of funding and/or financial incentives for the services or goods being brought to market. A variety of funding sources and financial incentives (such as grants, system rebates, low-interest loans, and loan guarantees) can be an effective method for helping to develop the market for biomass thermal energy. Thus far, grants have played an important role in helping establish many of the early installed projects. Over time, other financial incentives such as system rebates and creative financing options have come into play. Presented below is a summary of key funding sources and financial incentives that have been, or could be, used to advance the development and use of biomass thermal energy. This information is provided to inform future policymaking in the Northern Forest region (and beyond).

4.1 Federal Grants

Federal grants for biomass thermal energy have been available periodically over the years and have helped establish both individual biomass thermal projects as well as comprehensive programs that resulted in multiple biomass thermal projects within a given geographic area.

The USDA Forest Service is a long-time supporter of wood energy and has offered millions of dollars in grants to the development of a wood energy market to help achieve the forest management objectives of forest ecological restoration and stewardship thinnings to reduce risk of catastrophic wildfires. Many of the Fuels for Schools woodchip heating systems in western states such as Montana and Idaho were funded largely with grants from the USDA Forest Service. The Wood Education and Resource Center (WERC), a program of the USDA Forest Service, has offered a number of biomass energy grants over the years specifically aimed at the Northeast region of the US.[35] In addition, the USDA Forest Service administers a few other grant programs aimed at wood energy including the Woody Biomass Utilization Grants.

Other federal agencies that offer grant programs that can be used toward funding biomass thermal energy projects and programs include the US Department of Energy Biomass Program and USDA Rural Development, for example.[36, 37]

While many of the federal grant programs have resulted in multiple successful biomass energy projects, the funding is highly competitive and the availability of funds is variable, depending on federal priorities.

4.2 State Grants

State grants also have had a vital role in advancing biomass thermal energy in the Northeastern US. The Vermont School Energy Program provided grants to public schools installing woodchip and pellet systems over the last decade. Over the past two years, both New Hampshire and Maine have developed aggressive state grant programs that assisted a number of biomass heating projects – primarily for heating institutional buildings. Presented in Table 5 are highlights of key state funding programs that can be (or recently were) used for biomass thermal projects and/or programs:

[35] http://www.na.fs.fed.us/werc/grants.shtm
[36] http://www1.eere.energy.gov/bioenergy/
[37] http://www.rurdev.usda.gov/Energy.html

Table 5: Potential State Funding Sources for Biomass Thermal Projects

State	Agency	Funding Source
New York	New York State Energy Research and Development Authority (NYSERDA)	NYSERDA periodically issues competitive solicitations for R&D grants that could be used for biomass thermal technologies or projects.[38]
Vermont	Vermont Public Service Department (VT PSD) - Clean Energy Development Fund	$500k to be granted in 2014 as part of Community Clean Heat Challenge.
New Hampshire	New Hampshire Public Utilities Commission (NH PUC)	NH PUC offers grant funding (via noncompliance payments from RPS) for renewable-energy projects installed at commercial, industrial, public, non-profit, municipal or school facilities, or multi-family residences.[39]
Maine	Maine Forest Service (MFS)	$10 Million in one-time ARRA funds were available beginning in 2009. Funds have since been allocated and currently no future funding of grant program is in place.[40]
Massachusetts	Massachusetts Department Of Energy Resources (DOER)	"Green Communities" state renewable energy grant program allocates funds from Regional Greenhouse Gas Initiative (RGGI).[41]

Similar to federal grants, state grants can be an extremely helpful tool to selectively target new and innovative projects. Generally, federal and state funding is most effective when used on a sustained basis, over multiple years to fund programs and projects that address market barriers, and encourage the sustained, orderly development of markets over time, with reduced public intervention as the market matures. Looking to the future there is an opportunity to use one-time funding for grants to fund innovative and first of their kind projects (such as new CHP technology, district heating, and state of the art emission control technology). In addition, there is an opportunity to use modest state-level funding toward programmatic support services to catalyze the installation of multiple biomass heating projects.

[38] http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities.aspx
[39] http://www.puc.nh.gov/Sustainable%20Energy/RFPs.htm
[40] http://www.maine.gov/doc/mfs/arra/pages/documents/RFP200910535WoodtoEnergyProgramFinalfordistribution_MKandPJB.pdf
[41] http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/

4.3 Biomass Heating System Rebates

Rebate programs provide financial assistance to overcome initial capital costs that can be a barrier to customer investment absent the rebate. Optimization of such programs involve setting the rebate high enough to stimulate private investment, but low enough to enable sufficient rebates to generate enough participation to help develop the market. Presented in Table 6 are highlights of various state biomass boiler rebate programs:

Table 6: State Biomass Thermal Rebate Programs

State	Administrator	Requirements	Notes
New York	None at this time		
Vermont	Efficiency Vermont (EVT)[42]	• Fuel storage of at least one ton (or at least 7 days of uninterrupted system operations without refilling fuel storage) • Automated fuel feeding from fuel storage • On/off system controls • Ability to modulate firing as heating load increases/decreases. • Systems must meet all EPA and VT standards for PM emissions • Systems must be installed indoors by a professional	• Offers $1,000 toward a pellet boiler or furnace system (no stoves) • Legislative mandate is to provide 30% cost share – funding is currently insufficient to meet this funding level. • Current funding comes from forward capacity credit payments and RGGI payments to the State of Vermont.
New Hampshire	NH PUC[43]	• Primary residents (no second homes) • Thermal efficiency rating of 80% or greater • 0.32 lbs/MMBtu heat output or less for PM • Bulk fueled with a minimum of three tons storage capacity	• Offers 30% or $6,000 toward the cost and installation of a pellet boiler of furnace system (whichever is less) • Originally ARRA funded program now funded via Alternative Compliance Payments from NH electric utilities
Maine	Efficiency Maine[44]	• Details are still being sorted out	• Brand new program
Massachusetts	Clean Energy Center (CEC) [45]	• Year round home or small business	• Non-compliance payments for APS • One time pot of funds - $475,000 issued in March 2013 – over subscribed as of

[42] http://www.efficiencyvermont.com/for_my_business/ways-to-save-and-rebates/hvac/rebates/all_rebates.aspx
[43] http://www.puc.nh.gov/Sustainable%20Energy/RenewableEnergyRebates-WP.html
[44] http://www.onlinesentinel.com/news/Details-still-to-be-ironed-out-with-new-home-heating-rebate-program-from-Efficiency-Maine.html?pagenum=full
[45] http://www.masscec.com/programs/commonwealth-small-pellet-boiler-program

			June 6th 2013 • Offers between $7,000 and $15,000 toward high-efficiency pellet boilers

Programs to deliver modest financial rebates toward the purchase and installation of modern, efficient, clean burning, and centralized biomass heating appliances can play a key role in kick-starting the market. However, it is essential that rebate programs secure long-term stable funding sources and are managed to provide the optimal level of rebate to effectively stimulate fuel switching without overpaying and creating long-term market expectations and dependency.

Numerous states with pellet boiler rebate programs, such as Vermont and New Hampshire, are challenged with how to adequately and sustainably fund the programs as are other states looking to develop such programs, such as Maine. Three potential long-term funding mechanisms that could be used to provide adequate financial resources to state-wide rebate programs are discussed in detail in Section 5.0 of this report.

4.4 Tax Credits

Another policy option that is currently used in the region and could be expanded and extended is the use of tax credits. The following section discusses the current use and potential to further use sales, income, investment, and property tax exemptions/credits to incent the installation and use of biomass heating systems.

4.4.1 Sales Tax Exemptions

While waiving the state sales tax may not have a huge impact to incentivize the biomass thermal sector (most state sales tax is 4-7%), it is a powerful symbolic gesture that can send a positive signal to the market place that state policymakers support biomass thermal.

Table 7: State Sales Tax Policies for Biomass Boilers and Fuel

State	Sales Tax on Equipment	Sales Tax on Fuel
New York	Biomass boilers are subject to sales taxes.	Exempts wood for residential and multi-family housing heating fuel from state sales tax and allows towns to also exempt the fuel from local sales tax. Other sectors (schools, businesses have to pay sales tax on pellets, chips and firewood)
Vermont	Sales tax exemption for biomass boilers	Sales tax exemption for biomass fuel
New Hampshire	No sales tax for any goods or services	No sales tax for any fuel [46]
Maine	Charges 5% sales tax on boilers	Residential wood fuel is exempt. Commercial sector is taxed.
Massachusetts	Charges sales tax on boilers (MA offers sales tax	Residential heating fuels (including wood) are sales tax exempt. Commercial and industrial

[46] There is no sales tax on the fuel in New Hampshire but there is a state stumpage tax paid on wood fuel at the point of harvest.

	exemptions on solar hot water, PV, wind, heat pumps – just not biomass systems)	fuel is taxed but with some exceptions.

Of the five states examined, Vermont offers a sales tax exemption for both biomass heating appliances and for biomass fuel. The New Hampshire exemption is not because of a preferable treatment of biomass heating, but rather a component of their overall sales tax policy for all goods.

4.4.2 Income Tax Credits

No states in the US currently offer an income tax credit for the purchase of biomass thermal heating equipment. However, there are several states that offer income tax credits for other renewable energy equipment. For example, New York has an income tax credit (25% - maximum $5k) for solar PV and solar thermal systems.[47] In addition, New York offers an income tax credit for the purchase of bio-diesel fuel for residential space and water heating. [48] These are two examples of state income tax credits used on both alternative heating ***equipment*** and alternative heating ***fuel*** that could potentially be extended to apply to biomass heating.

While there are currently no state income tax credits available for biomass thermal, it is important to note a federal bill introduced by Senator Angus King of Maine on May 22, 2013. The **Biomass Thermal Utilization Act of 2013 (BTU Act)** is a bill that proposes to amend the Internal Revenue Code of 1986 to include biomass heating appliances for tax credits available for energy-efficient building property and energy property. The bill would provide a 30% tax credit for high efficiency residential biomass heating equipment and a two-tiered Investment Tax Credit of 15% or 30%, depending on the operating efficiencies for commercial and industrial biomass systems. [49]

The bill defines "qualified biomass fuel property expenditure" as an expenditure for property which uses the burning of biomass fuel (a plant-derived fuel available on a renewable or recurring basis) to heat a dwelling used as a residence, or to heat water for use in such dwelling, and which has a thermal efficiency rating of at least 75%. The bill allows an energy tax credit until 2017 for investment in open-loop biomass heating property, including boilers or furnaces which operate at thermal output efficiencies of not less than 65% and provide thermal energy.

This bill has not yet passed out of committee and has not yet been voted on by either the US Senate or the US House of Representatives. It is not certain the bill will continue to move as the Chairs of the House and Senate tax writing committees seek to reform the tax code. In general, the focus on tax reform has ceased discussion about new tax proposals at this time. If this Congress moves forward with tax reform, it seems unlikely new taxes will be added to the tax code. If tax reform fails, the tax committees might return to the regular order of considering bills and this bill could potentially be reconsidered at that time.

[47] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY03F&re=0&ee=0
[48] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY84F&re=0&ee=0
[49] http://www.govtrack.us/congress/bills/113/s1007

4.4.3 Investment Tax Credits

In addition to income tax credits, it is possible for state and federal governments to provide investment tax credits to businesses that make investments in biomass heating systems. Of the five states reviewed for this study, Vermont currently offers an investment tax for installations of renewable energy equipment on business properties, including biomass equipment. The credit is equal to 24% of the "Vermont-property portion" of the federal business energy tax credit.[50] This investment tax credit is not applicable to individuals.

One interesting example that could be considered by other states is the Oregon tax credit for Renewable Energy Equipment Manufacturers. Targeted for industry recruitment, biomass boiler manufacturers who set up in Oregon are eligible for a business tax credit of 50% of eligible costs (10% per year for 5 years).[51]

4.4.4 Property Tax Exemptions

New York, Vermont, and New Hampshire state laws allow the option for municipal governments to waive property taxes for various renewable energy projects including biomass. Maine does not have such a law in place. Massachusetts law does not list biomass as an eligible form of renewable energy for their property tax exemption.

4.5 Finance Mechanisms

Another approach to stimulating market activity is to develop programs that provide access to financing. In addition to traditional commercial financing, there are numerous creative financing programs supported by public policy. Each state has multiple financing options such as, for example, revolving loan funds targeted for community projects that include the use of renewable energy. In addition, federal agencies such as the USDA Rural Development Agency offer low/no interest loans, loan guarantees, and other financial instruments.

4.5.1 Property Assessed Clean Energy (PACE)

An emerging and potentially important way for financing energy efficiency upgrades or renewable energy installations for buildings is through a Property Assessed Clean Energy (PACE) offering. In areas with enacted PACE legislation, local governments can offer to loan money to residents and businesses to install energy retrofits and renewable energy systems through the issuance of a municipal bond. The energy-related capital costs are repaid by the property owner over the term of the loan (typically 20 years) through an assessment on their property tax bill by the municipality. This type of creative financing approach helps home and small-business owners overcome the significant upfront costs of installing energy efficiency measures and renewable energy systems, such as biomass heating systems.

To date PACE enabling legislation has passed in 30 states. Thus far all of the Northern Forest states have enacted PACE programs and the status of the PACE offerings in the states is provided in Table 8:

[50] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT37F&re=0&ee=0

[51] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR107F&re=0&ee=0

Table 8: PACE Offerings in the Northern Forest States

State	PACE Program Manager	Details
New York	Energize New York[52]	Commercial and low-income housing sectors in select communities
Vermont	Efficiency Vermont	State enabling legislation passed residential program offered in 13 municipalities that have passed local PACE enabling resolutions thus far.[53]
New Hampshire	None	State enabling legislation passed but no program enacted yet.
Maine	Efficiency Maine	Residential
Massachusetts		Municipalities are authorized to create revolving loan funds.

Once state level legislation has passed, the local adoption PACE financing works through a progression of basic steps:

1. The local government creates a PACE assessment or charge.
2. The property owner agrees to the terms offered by the local government.
3. Local government provides the financing for the project and adds the assessment of the project to the property owner's tax roll.
4. The property owner pays the assessment to the local government for up to 20 years.

To date, PACE programs have been slow to get started, with Vermont currently being the farthest along in the Northern Forest region. Key provisions in the Vermont enabling legislation include:[54]

- The legislation enables municipalities to create and secure debt for a PACE program if they choose, and to secure funding to pay for energy efficiency and renewable energy projects.
- Participating municipalities can join together to obtain funding more cost effectively.
- Participating property owners pay for the benefit over up to 20 years through a special assessment charged as an additional line item on their property tax bills.
- The maximum amount that can be financed is 15% of the assessed value of the property, capped at $30,000. The total amount financed by PACE plus any outstanding mortgages on the property cannot exceed 90% of the assessed value.
- Participants must contribute to a loan loss reserve fund.
- Non-participating property owners have no obligation to pay for any of the costs of a PACE district.

There are some significant benefits to a PACE program. It is a creative way to remove the financial hurdle of the high capital costs of renewable energy projects. Biomass heating systems are eligible. PACE allows for positive cash flows because the debt service is spread over 20 years rather than the 5 to 10 years commonly offered through bank financing. In addition, property owners who do not choose to participate incur no cost.

[52] http://energizeny.org/

[53] To date, 13 Vermont towns have voted to create PACE districts including Albany, Burlington, Cornwall, Craftsbury, East Montpelier, Halifax, Marlboro, Montpelier, Newport, Putney, Thetford, Waitsfield and Westminster.

[54] http://pacevermont.wikispaces.com/Welcome+to+PACE+Vermont

4.5.2 Clean Renewable Energy Bonds (CREBs)

The federal Energy Act of 2005 established this financial mechanism to finance renewable energy projects – primarily by the public sector. Administered by the IRS, Clean Renewable Energy Bonds (CREBs) are tax credit bonds, where the borrower who issues the bond pays back only the principal of the bond, and the bondholder receives federal tax credits in lieu of the traditional bond interest. The tax credit may be taken quarterly to offset the tax liability of the bondholder.[55] The program is relatively complex and few, if any, have used this to finance biomass thermal projects.

[55] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US51F&ee=1

5.0 Legislative Policy Overview

In addition to the renewable energy, regulatory, and financial policies discussed above, there are state-level Renewable Portfolio Standards (RPS), System Benefits Charges (SBC), and Lead by Example (LBE) policies and/or programs that can have significant impacts on market development in a state. Presented below is the status of RPS, SBC, and LBE policies in place in the four Northern Forest states (as well as other states, when relevant to the discussion). This information is provided to help inform future biomass thermal legislative policy activities in the Northern Forest region.

5.1 Thermal Inclusion in State Renewable Portfolio Standard

A Renewable Portfolio Standard is a policy that requires increased production of energy from renewable energy sources. An RPS policy generally places an obligation on ***electric utilities*** within a given jurisdiction to produce a specified portion of their ***electricity*** from renewable energy sources – such as wind, solar, biomass, hydro, etc. RPS policies typically allow generators of approved renewable energy to earn certificates for every unit (typically a megawatt hour [MWh]) of electricity they produce. These certificates (referred to as Renewable Energy Credits [RECs]) can be sold to the utilities to demonstrate they meet the required RPS targets. RECs are the foundation of an RPS policy and provide a market mechanism for achieving policy goals stated in an RPS. When a power producer generates 1 MWh of renewable energy, it generates 1 REC. The power producer can sell the REC to a utility to help the utility meet their state-mandated target for renewable energy in the state's energy portfolio. This market-based system provides incentive for the construction of new renewable energy systems and increases demand for their output.

Over the course of roughly two decades, state-level Renewable Portfolio Standards for the promotion of renewable ***electric*** energy have been widely adopted – today 29 states and the District of Columbia have some sort of Renewable Portfolio Standard (RPS) in effect.[56] While most states with an RPS focus on electrical energy generation, the same concept can be applied to both energy efficiency and thermal energy. Currently 12 states include CHP eligibility in their electrical RPS.[57] Several states also currently allow energy efficiency as a means to generate RECs.

In addition to the targets for achieving certain levels of electrical energy from renewable sources, there is growing interest among the biomass and solar thermal industries as well as among some regulators and policymakers to include thermal energy in RPS strategies. They pose this would achieve a more comprehensive approach to energy policy that addresses both electricity and thermal energy simultaneously. Conceptually, there are two ways to include thermal energy in an RPS:

- Develop a separate thermal RPS that requires fossil heating fuel suppliers to purchase RECs from renewable thermal energy generators; or
- Allow thermal energy from eligible renewable energy sources to qualify for RECs purchased by electric utilities that currently are only allowed to purchase RECs from renewable electric generation.

[56] http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf
[57] http://www.dsireusa.org/

It is technically possible for thermal energy to be metered and measured (just as electricity is) and in many countries other than the US it is common to do so. Although in the US thermal energy is most often measured in British Thermal Units (BTU), it is already common in other countries to meter, measure, and sell thermal energy on the basis of kilowatt-hour equivalents. Thinking about and measuring thermal energy in terms of kilowatt or megawatt hours enables the application of an RPS to readily include thermal energy as well as electricity. Typically, each REC has a minimum value of 1 kWh for the purpose of RPS compliance. For a thermal credit, 3,412 Btu of useful thermal energy is equivalent to at least 1 KWh for purposes of compliance with an RPS.

Presented in Table 9 is a summary of states that have adopted some form of thermal energy in RPS policies (usually focused on solar thermal and not biomass thermal), and that now enable the selling of thermal RECs:[58]

Table 9: States with an RPS that Includes Thermal Energy

State	Type of Thermal Energy Recognized in RPS
Arizona	Solar water heat & solar space heat
Delaware	Solar water heat & solar space heat
Hawaii	Solar water heat, solar space heat, & solar process heat
Indiana	Solar water heat & solar space heat
Nevada	Solar water heat & solar space heat
New Hampshire	A range of renewable energy sources, including biomass thermal
New York	Solar water heat
Pennsylvania	Solar water heat, solar space heat, & solar process heat
Utah	Solar water heat, solar space heat, & solar process heat
Washington D.C.	Solar water heat, solar space heat, & solar process heat
Wisconsin	Solar water heat & solar space heat

The inclusion of thermal energy from renewables in an RPS results in the need to meter and measure the energy. Btu meters are commercially available on a widespread basis in Europe, for example, and consist of a relatively simple combination of supply and return temperature sensors, a flow gauge, and a calculator. Currently, there are no official heat metering standards at the national level in the US. Both the ASTM and the US EPA are working on adopting a national standard for accurate measure and reporting of thermal energy. The cost to measure and verify thermal energy is a factor when considering a thermal RPS and economies of scale are likely to inspire utilities to source thermal RECs from larger energy projects.

Recent analysis conducted by Future Metrics and presented at the 2013 Heating the Northeast Conference indicates that, given the higher system efficiencies of biomass thermal energy projects compared to biomass power plants, thermal RECs are expected to have a lower cost of compliance than RECs produced from biomass power plants due to the cost of the fuel and the efficiency of its use.[59] Based on this rationale, RECs produced by biomass thermal energy projects may present a lower cost of compliance than biomass power plants for utilities operating in states with a biomass thermal RPS in place.

[58] http://www.dsireusa.org/
[59] http://heatne.com/pdfs/2013/Breakout%20Session%201/strauss.pdf

It is very important to note that thermal eligibility in RPS policies do not necessarily offer price certainty for thermal RECs and one of the greatest barriers to biomass thermal energy is the high first costs which typically would not be addressed by annual thermal REC payments. In order to make thermal RECs effectively overcome the first cost barrier of purchasing and installing biomass heating systems, creative RPS mechanisms need to be used–such as issuing multi-year (5-10) "strips" of thermal RECs to create bankable revenue that can be used toward successfully financing projects.[60] By allocating multi-year strips of RECs to qualifying renewable energy projects, the market value of the REC strip does not fluctuate overtime and can therefore be used to secure project financing.

5.1.1 Example – New Hampshire's Recent Inclusion of Thermal Energy in their RPS

In 2012 the New Hampshire legislature passed Senate Bill (SB) 218 to include thermal energy in the State's existing RPS policy. According to the law, the "Class I Thermal Renewable Energy Certificate Program" is an amendment of the Renewable Portfolio Standard law and creates a Class I sub-class for useful thermal renewable energy from solar, biomass, and geothermal sources. Effective January, 2013, **0.2%** of Class I REC requirements are to be met with thermal resources. The requirement increases by **0.2%** annually to **2.6%** by 2025. The New Hampshire Public Utilities Commission (NH PUC) is required to "establish procedures by which electricity and useful thermal energy production not tracked by ISO-New England from customer-sited sources, including behind the meter production, may be included within the certificate program, provided such sources are located within NH."[61]

This new law requires the NH PUC to establish procedures for metering, verifying and reporting thermal energy output from qualifying systems on a quarterly basis. The PUC will then certify this energy output for Renewable Energy Certificates which can then be bought and sold in regional REC markets, just as electricity is. Systems will require BTU meters in order to accurately meter heat energy output.

The law sets the Alternative Compliance Payment (ACP) for renewable thermal energy at $28/MWH, the lowest level of any existing class. It is likely that RECs will sell for less than the $28/MWh ACP. The small percentage increase in the RPS mandate, combined with a low ACP is expected to result in a bill impact of $0.098 (9.8 cents) per month for an average residential electric bill of 600 kWh.[62]

The law also establishes emissions standards for biomass heating systems, as proposed and supported by the New Hampshire Department of Environmental Services (NH DES) including the following:

- For biomass energy systems between 3 and 30 MMBtu/hr (input capacity), systems must demonstrate one time stack testing emissions rate below 0.1 lbs/MMBtu for particulate matter.
- For biomass energy systems greater than 30 MMBtu/hr (input capacity), systems must demonstrate emissions rates less than 0.02 lbs/MMBtu.

[60] http://www.mass.gov/eea/docs/doer/pub-info/heating-and-cooling-in-aps.pdf
[61] http://www.puc.state.nh.us/Sustainable%20Energy/Class%20I%20Thermal%20Renewable%20Energy.html
[62] Ibid.

5.1.2 Example - Massachusetts Legislation to Add Thermal renewable Energy to APS

In the beginning of 2013, members of the biomass, geothermal heat pump, solar thermal, renewable natural gas, bio fuel, and oil supply industries came together to create a campaign to enact legislation that would include a Thermal Energy component in the Massachusetts Alternative Energy Portfolio Standard (APS).[63] On January 18, 2013, Massachusetts Senate Bill (SB) 1593 was filed by Sen. Finegold of Andover. SB 1593 would add heating and cooling from renewable fuels to the technologies eligible for Alternative Energy Credits in the state. Technologies that produce useful thermal energy using fuels such as sunlight, biomass, bio-gas, bio-liquids, and temperature differences in the ground and air would be eligible. Such technologies currently can receive credits when used to produce electricity, but not when used to produce thermal energy. Public testimony on SB1593 was taken in July of 2013 and the bill is now in joint committee. SB 1593 is presented in Appendix A.

Similar legislation was recently introduced in Maine (see Appendix B) and Connecticut to recognize thermal renewable energy sources as part of the compliance strategies in their electrical RPS.

5.2 System Benefits Charge (SBC) on Heating Fuels

For many years numerous states have imposed a modest surcharge on regulated forms of energy –specifically electricity and in some cases natural gas. Revenues generated from the surcharge are used to finance energy efficiency programs delivered by electric and gas utilities, or by a third-party program administrator such as Efficiency Vermont and Efficiency Maine. These energy surcharges are referred to as a "system benefits charge" (SBC) when applied to electricity and referred to an energy efficiency charge (EEC) or location distribution adjustment charge (LDAC) when applied to natural gas. They have generated billions of dollars throughout the US that are invested in energy conservation and efficiency programs that benefit rate payers served by the utilities, and can serve as a model for a similar surcharge that could potentially be used to advance biomass thermal energy.

As referred to by biomass thermal advocates, a "thermal SBC" could take the form of a modest assessment administered at the state level on heating fuels, such as oil and propane. The main challenge for applying an SBC approach to biomass thermal is that SBCs are typically assessed on customers of regulated energy utilities and the incentives created by these surcharges generally do not fund programs that *eliminate* the customer's use of the that regulated energy – but rather *lower* their use (i.e. efficiency). Following the example of an SBC applied to electric bills, a thermal SBC could be used to fund thermal efficiency measures (rather than for fuel switching).

A legislative proposal was recently made in Massachusetts to establish an SBC of $.025 (or 2.5 cents) per gallon for heating oil and propane, the proceeds from which would be used to fund energy efficiency programs directed at heating oil and propane users.[64] A full copy of Massachusetts H.3897 can be found in Appendix D.

[63] http://www.masscleanheatbill.org/
[64] https://malegislature.gov/Bills/187/House/H03897

A recent op-ed article included a detailed proposal for how a thermal SBC could be implemented and how the funds could be used.[65] The article called for establishing a fund through a thermal SBC that would be used to:

- Finance comprehensive education and outreach to the residential, commercial, and industrial sectors;
- Support the adaptation of the traditional fossil heating appliance and fuel industry to renewables; and
- Provide financial incentives, such as rebates, toward the purchase and installation of biomass heating systems.

It is further suggested that the SBC fee be applied to both fossil fuels used for heating and to renewable fuels, such as wood pellets, where there is a mature fuel distribution system in place. The SBC could be adjusted periodically to help level out the highs and lows of fossil heating fuel prices, and might be faded out over time as the renewable energy-based thermal market matures. The use of an SBC applied to both fossil and renewable fuels, such as wood pellets, used for thermal energy is an interesting policy option for further stimulating the biomass thermal market in the Northern Forest region. Examples of key questions to consider further in future policy activities should include:

- How to tie the SBC to achievable and measurable goals as an RPS policy does?
- Whether the SBC should apply to all heating fuels including renewables, such as wood pellets and chips?
- What is the optimum value for an SBC and how much of a thermal SBC fee would be tolerated by policymakers, regulators, the thermal industry, and consumers?
- How to ensure fair and equitable access to funds by all sectors: residential, commercial, and industrial?
- How to establish program and policy without technology or fuel bias?
- Who will evaluate, measure, and verify progress toward meeting goals?

One interesting example of an existing heating fuel surcharge is the Vermont Weatherization Trust Fund which applies a 0.5% tax on gross sales receipts on the suppliers of heating fuels including natural gas, heating oil, propane, and kerosene to help fund low-income weatherization programs in the state.[66] Such a program could serve as a template and could potentially be expanded to provide funding to renewable heating technologies such as biomass and solar to compliment the current efficiency programs.

5.3 Public Lead by Example (LBE) Programs

State and municipal governments own and operate hundreds of facilities and this presents a unique opportunity for governments to lead by example. Installing energy efficiency measures and renewable energy systems can help state and municipal governments lower energy costs, reduce carbon emissions, and perhaps most importantly visibly demonstrate to the private sector that renewables, such as biomass thermal, work and are becoming more mainstream. State governments have often become leaders in the use of renewables by taking action through legislation or executive order to achieve a target goal for energy use in their own buildings and vehicles. Municipal governments are increasingly taking actions as well.

[65] http://www.renewableenergyworld.com/rea/news/article/2012/07/time-to-consider-a-thermal-system-benefits-charge
[66] http://www1.eere.energy.gov/wip/solutioncenter/pdfs/fundingforenergyefficiencyprogramsforunregulatedfuels.pdf

State and local governments operate many facilities, including office buildings, public schools, colleges, and universities, and the energy costs to run these facilities can account for as much as 10% of a typical government's annual operating budget.[67] An excellent example of a LBE policy adopted by state government is the Vermont Buildings and General Services Department (VT BGS) whose energy plan calls for the use of biomass heating systems in state owned facilities.[68] Vermont BGS manages dozens of buildings (court houses, state office buildings, police facilities, and hospitals) heated with woodchips, pellets, and cordwood. Two other examples of state government LBE programs are the 2011 NH Hampshire Executive Order calling for reduced energy consumption and increased energy efficiency and the Massachusetts Energy Reduction Plan for State Buildings.[69, 70]

5.4 Building Code Requirements

In addition to LBE, state and local governments have the option to enact building code requirements that set energy efficiency thresholds and thresholds for the use of renewable energy. While there are numerous examples of voluntary building certification systems such as LEED that provide points toward the use renewables, there are few states that have pursued mandatory policy.

All states that accepted federal American Resource Recovery Act (ARRA) funds were required to pledge to the U.S. Department of Energy that they would achieve 90% compliance with International Energy Conservation Code (IECC) in residential buildings and the ANSI code for commercial buildings by 2017. That is an ambitious target and there is no enforcement mechanism in place for monitoring progress. Many states have adopted such codes while indicating meeting the codes is voluntary. One state that has enacted mandated building code requirements for energy efficiency is California where mandatory building efficiency standards were adopted in 2008.[71] In Europe, building code requirements for the use of energy efficiency and renewables are widespread. Upper Austria, for example, has a requirement since 2008 that all new or renovated private buildings larger than 10,000 square feet in size must use renewable energy for space and hot water heating.[72]

[67] http://www.aceee.org/sector/state-policy/lead-example-initiatives
[68] http://bgs.vermont.gov/sites/bgs/files/pdfs/BGS-VTStateEnergyPlan.pdf
[69] http://www.nh.gov/dot/media/documents/energy-sept08.pdf
[70] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA13R&ee=0
[71] http://www.energycodes.gov/adoption/states/california
[72] http://www.esv.or.at/fileadmin/redakteure/ESV/Info_und_Service/Publikationen/Biomass_heating_2010.pdf

6.0 Discussion of Market Drivers, Barriers, and Policy Solutions

Despite the variety of renewable energy, regulatory, and financial policies in place already in the Northern Forest region, some of which specifically address biomass thermal energy, a variety of barriers exist to further development of the biomass thermal market. Presented below is an overview of key market drivers affecting development of biomass thermal in the region, discussion of key barriers to further market development, and suggestions for policy solutions that could address the barriers. [73]

6.1 Market Drivers

The use of biomass thermal energy provides a variety of societal benefits including: the increased economic activity resulting from the use of local fuels; the positive environmental impacts of using renewable, low-carbon fuel; providing a market for biomass resulting from sound forest management practices; and keeping energy dollars in the local economy. In addition to these benefits, perhaps the greatest driver behind this sector's growth to date are the economic savings achieved for the end user from the lower cost of heating with biomass fuel compared to other heating fuel choices. Biomass heating fuels such as cordwood, woodchips, and wood pellets are typically 25 to 60% of the cost of fossil heating fuels, such as oil and propane, when assessed on the basis of cost per unit of energy (or heat) delivered to the customer. As shown in Table 10, heat provided by woodchips costs the end user $8.36 per million Btu (MMBtu) while the same amount of heat provided by propane costs the end user $35.17.

Table 10: Comparison of Heating Fuel Costs[74]

Fuel Type	Cost per Unit	Btu per Unit (dry)	Moisture Content	Average Seasonal Efficiency	Cost per MMBtu After Combustion
Natural Gas (ccf)	$1.15	102,800	0%	85%	$13.16
Oil (gallon)	$3.75	138,000	0%	80%	$33.97
Propane (gallon)	$2.75	92,000	0%	85%	$35.17
Woodchips (green ton)	$56.00	16,500,000	42%	70%	$8.36
Wood Pellets (ton)	$230.00	16,500,000	6%	80%	$18.54

6.2 Barriers to Biomass Thermal Energy

Despite the societal and end user benefits of biomass thermal energy, numerous barriers continue to impede market expansion for biomass heating. These barriers are discussed below.

[73] http://www.mass.gov/eea/docs/doer/renewables/renewable-thermal-study.pdf

[74] Calculated values based on average regional heating fuel prices for 2012/2013 heating season.

6.2.1 Capital Costs

Perhaps the single largest barrier is the high upfront capital cost for biomass heating equipment compared to natural gas, propane, or oil-fired furnaces or boilers. The purchase and installation costs for automated, self-feeding wood pellet and woodchip systems range from two to five times the cost of fossil fuel heating systems. A typical installed cost for a modern, efficient, bulk fueled residential pellet boiler is roughly $19,000 whereas a comparable oil system may cost approximately $8,500.[75]

6.2.2 Access to Capital

Despite the compelling potential heating fuel savings, borrowing funds to for the purchase and installation of biomass heating systems is a major challenge for both the residential and commercial markets. Many banks and traditional lenders perceive renewable energy financing as risky and often require higher interest rates, more owner equity, and shorter finance terms.

6.2.3 Public Awareness and Misconceptions

Modern, efficient, clean burning, automatically-fed biomass heating systems are not widely understood in the general public or in the heating, ventilating, and air conditioning (HVAC) industry in the US. Lasting impressions continue of outdated technologies which are remembered as dirty, unreliable systems that produce smoke. Key areas where there continue to be misconceptions about the potential impacts of expanded biomass thermal energy are:

- System performance and reliability;
- Emissions;
- Forest sustainability; and
- How biomass thermal solutions compare against other heating options.

6.2.4 Lack of Regulatory and Policy Framework to Incentivize Biomass Thermal

The thermal energy industry operates in an open and competitive market and is therefore not regulated in the same way the electric and gas utility industries are (both of which operate in a geographically-bound monopoly). As a result, the regulatory framework and mechanisms that are used to create and implement energy efficiency and renewable energy goals and requirements for electric and gas utilities do not apply to propane and heating oil suppliers. The thermal energy sector, as a result, lacks a regulatory structure and related regulatory mechanisms to incentivize thermal efficiency and renewable energy use compared to the electric sector.[76] Policies and programs designed to reduce consumption of fossil fuels through thermal efficiency measures and the use of renewable energy such as biomass face the challenges of securing funding sources and political difficulties in applying charges on fuels not regulated by the state Public Utility Commissions that oversee the electric sector.

6.2.5 Other Barriers

Looking beyond the propane and heating oil option, two additional barriers exist that may prove even more significant in the future. The push to expand the piping networks of natural gas in New England and the move to provide heating with electric-driven air source heat pumps will likely increase dramatically in the years ahead. Already several states in the region are moving toward policies that expand the use of natural gas and electricity to replace heating oil and meet their GHG emission targets.[77]

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[75] Based on recent direct communications with numerous pellet and oil boiler vendors.

[76] http://www1.eere.energy.gov/wip/solutioncenter/pdfs/fundingforenergyefficiencyprogramsforunregulatedfuels.pdf

[77] http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/TES/Total_Energy_Study_RFI_and_Framing_Report.pdf

6.3 Policy Option Optimization

To optimize the effectiveness of policies aimed to advance biomass thermal energy, ideally policies should be developed in a way that seeks to directly address the key barriers discussed above. Presented in Table 11 are examples of policy options (or solutions) for addressing the key barriers.

Table 11: Policy Options for Overcoming Market Barriers for Biomass Thermal Sector

Barrier	Potential Policy Solution
High capital costs	• Federal 30% tax credit • State income tax credits • State funded rebate programs • Thermal inclusion in RPS in a way that creates "credit worthy" thermal RECs used toward capital costs
Public awareness	• Adopt policies such as "lead by example" programs by state and local government • Provide program support services to show case "best in class" projects using modern, efficient biomass thermal technologies • Support education, outreach, and training for architectural, building construction, insurance, real estate, and engineering professions
Lack of regulatory framework for thermal sector	• Develop comprehensive "total energy" approach including electrical, thermal, and transportation energy • Expand RPS to include thermal energy • Apply SBC to heating fuels
Expanded natural gas service into new jurisdictions	• Apply a SBC to natural gas to further fund thermal efficiency and renewables such as biomass
Expanded use of electric powered air source heat pumps	• Create policies to encourage the combined use of biomass boilers and heat pumps as back-up systems

6.3.1 Policy Design Criteria

No single biomass thermal policy is a "silver bullet" solution to solving the multitude of current and future barriers to biomass thermal energy. Instead, it will be a combination of policies that work together that will be needed, with some policies having greater impacts than others.

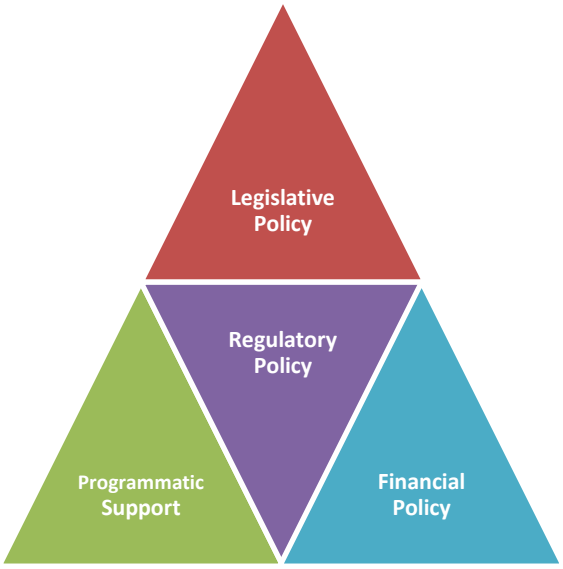
Ultimately, each state will need to evaluate numerous policy options and determine which policies will best achieve the desired effect. Presented in Table 12 are potential design strategies to use when considering potential policies to advance biomass thermal energy in a state.

Table 12: Design Strategy for Developing Biomass Thermal Policies

Design Strategy	Design Considerations
Pursue a multi-sector approach	Need to seek policies that support residential, commercial, institutional, and industrial sectors as well as community-scale district heating and that avoid benefitting one sector over another.
Create market "pull"	Need to help overcome the capital cost barrier (i.e. – if more boilers are installed, there is more demand for fuel.). Seek to avoid situations that try to push the market through over subsidizing the fuel.
Demonstrate the new "normal"	Need to help show that biomass heating is not "fringe" but rather an increasingly "mainstream" way to reliably and cost – effectively heat homes, businesses, and institutional buildings.
Expand markets within the regional resource capacity	Need to ensure markets do not grow beyond the regional capacity for sustainable biomass fuel supply.
Enhance market stability and predictability	Need to provide industry a stable, predictable regulatory environment as well as financial incentives that can be sustained over time as the market moves to increased private equity investments.
Create incentives from the thermal sector	When possible, strive to develop thermal incentives that are funded from within the thermal sector. Drawing funds for thermal incentives from the electric sector is not ideal under the current regulatory structure in most states.

A combination of policies is needed – regulatory, legislative, and financial as well as a programmatic structure and support for achieving the policies. Each state is unique and will design its own package of policies, and the ideal approach should use a portfolio of policies that include elements from each of the categories depicted in Figure 2 below:

Figure 2: Policy Pyramid



This approach to packaged biomass thermal policy and program development is similar to the approach used by the Upper Austrian energy agency (Oberösterreich Energiesparverband), an international leader in biomass thermal market transformation. The OÖESV advocates the "carrot, stick, and tambourine" approach in which the stick refers to legal approaches (fuel quality, emissions, and efficiency standards as well as building energy code mandates), the carrot refers to financial incentives (grant programs, etc.), and the tambourine refers to education, outreach, and training services.[78]

6.3.2 Example Impact of Incentives on Typical Residential and Commercial Project Economics

To help optimize biomass thermal policies and better understand how much of what kind of incentive could help further the biomass thermal market, a basic financial analysis was performed as part of this study. It was based on a hypothetical residential home that was converting from heating with oil to heating with wood pellets for a central boiler system. The analysis was done with the objective of determining what the optimum levels of incentive are. Below are key assumptions used in the analysis:

Table 13: Key Assumptions for Residential Scenario Analysis

Annual heating oil use	1,000 gallons
Heating oil price	$4.00 per gallon
Pellet boiler capital costs	$19,000
Pellet fuel cost	$235 per ton
Percent borrowed	80%
Financing term	7 years
Interest rate	6.5%

[78] http://www.esv.or.at/fileadmin/redakteure/ESV/Info_und_Service/Publikationen/Biomass_heating_2010.pdf

In this example, the first year savings would be $2,026 and the investment would have a less than 10 year simple payback. The first year cash flow is negative because the annual debt service ($2,708) is greater than the potential fuel savings. This is a situation where some level of subsidy could help encourage a homeowner to make the investment in a biomass thermal energy alternative. In this scenario, a ***27.5%*** subsidy to lower the upfront costs would be necessary to create positive cash flow beginning in year 1. However, it is important to note that there a different ways to achieve the same goal of breakeven cash flow. Another option would be to increase the term of borrowing. In this case, simply extending the term from 7 to 11 years would yield a cash flow positive outcome begin in year 1 in the example cited above.

Below are key assumptions used in a similar analysis for a typical commercial building conversion from heating oil to pellets:

Table 14: Key Assumptions for Commercial Scenario Analysis

Annual heating oil use	5,000 gallons
Heating oil price	$3.50 per gallon
Pellet boiler capital costs	$54,000
Pellet fuel cost	$235 per ton
Percent borrowed	80%
Financing term	7 years
Interest rate	6.5%

In this example, the first year savings would be $7,365 and the investment would have a less than 8 year simple payback. The debt service would be slightly higher than the annual fuel savings and as a result the year one cash flow is slightly negative ($332). This is a situation in which only a small subsidy would be needed to encourage a commercial building owner to make the investment in a biomass thermal energy alternative. In this scenario a ***4.5%*** subsidy to lower the upfront costs would be necessary to achieve a positive cash flow beginning in year 1. Similar to the residential scenario above, another option to achieve breakeven cash flow in year 1 would be to increase the term of borrowing. Extending the term from 7 to 8 years would yield a cash flow positive outcome beginning in year 1 as well.

The hypothetical scenarios above illustrate three important points that should be taken into account as when policies strategies are considered— 1. the amount of subsidy needed to catalyze biomass thermal market expansion is dynamic and changes depending on various market conditions (i.e. a simple increase in heating oil price can dramatically improve the economics of a typical project) 2. subsidy is one approach but there are other ways to bridge the economic gaps and 3. the economic gap that needs to be bridged with subsidy is often smaller for larger buildings with larger heat loads.

7.0 Summary, Conclusions & Recommendations

Research and policy analysis conducted for this study confirms substantial opportunities exist in the four-state Northern Forest region for advancing the use of biomass thermal energy through new and expanded policy initiatives. Doing so could result in both societal benefits, such as increased economic activity and improved environmental impacts from energy use, as well as end user benefits in the form of decreased heating fuel costs. Presented below are the key conclusions resulting from the study, organized in response to the four key questions the study was designed to address.

Question 1: ***What are the policies and regulations currently in effect in the Northern Forest region that affect development and use of biomass thermal energy and where are there gaps?***

There are currently a wide range of regulatory, financial, and legislative policies in use in the region that impact the biomass thermal energy sector. Table 15 illustrates where these various policies are in place and where there are presently gaps.

Table 15: Summary of broad categories of policies that could support biomass thermal

	NY	VT	NH	ME	MA
Flexible Boiler Regulations		√	√		
Sales Tax Exemption on Biomass Appliances		√	√	Partial	Partial
Sales Tax Exemption on Biomass Fuel		√	√	Residential only	Residential only
State Income Tax Credit			N/A		
Pellet Boiler Incentives		√	√		√
PACE Financing		√			
Thermal RPS			√		Almost
State Grants for Biomass Thermal Projects	√	√	√	√	√
Government "Lead by Example" for Biomass Thermal		√			√
System Benefits Charge		For weatherization only			
Mandatory Renewable Energy Targets Applied to Building Codes					

The green highlighting in the table above indicates where there are policy gaps that present opportunities for consideration and pursuit of well-rounded and complete package of policies aimed to advance biomass thermal energy in the region.

Question 2*: How have existing policies and/or regulations helped to advance or to hinder biomass thermal energy in the region?*

Generally speaking, the most effective policies are those that directly help overcome the two biggest barriers to biomass thermal energy – high first costs and public perceptions. While it is

difficult to isolate any single policy with the greatest impact, it is reasonable to conclude that the recent biomass market growth can be attributed to improving market conditions (rising oil and propane prices, increased numbers of quality system vendors and fuel suppliers, etc.) and the combinations of various policies at work in each state. Of the states reviewed in this report, Vermont has the broadest combination of policies toward biomass thermal energy and also has arguably the most developed biomass thermal market. While it is likely there is a direct correlation between the package of policies and the successful market build out, Vermont's success is, at least partially, a function of the long history of wood energy policies and programs.

As for policies that hinder biomass thermal energy, no single policy stands out as a primary hindrance. Instead, it is the *absence* of the full package of policies that could advance biomass thermal energy that is the greatest hindrance.

Question 3: ***What new policies are needed to advance biomass thermal energy? Has legislation been developed that can serve as model legislation for other states?***

Each state is different and their policies and regulatory structure are generally not inter-changeable – there is no one size fits all solution. As a result, individual policies and combinations of policies need to be (and should be) tailored to each state. Furthermore, the residential, commercial, and institutional biomass heating markets and their expansion in each state are each impacted differently by policies.

Generally, there is a need for greater regulatory policy consistency (air emissions, boiler safety, etc.) across the region. There is also a need for "low-hanging fruit" policies that can effectively help incent the biomass thermal market without getting into onerous legislative processes that can be expected to be more controversial and complex to implement. Simple policies like state sales tax exemptions and income tax credits could provide "low hanging fruit" policy opportunities in the region.

Table 16 – List of possible policy options ranked by relative simplicity to adopt

Relatively Straight Forward ↓ **Increasingly Complex**	Sales tax exemption on efficient clean biomass heating appliances and fuels
	State income/investment tax rebate on high efficiency clean biomass heating appliances
	Adopting flexible boiler regulations
	Adopting government agency LBE policies
	Modest boiler rebates via cobbled funding sources
	Aggressive subsidies funded through comprehensive energy policies like Thermal RPS and SBS.
	Mandatory renewable energy use in building codes

However, the greatest need for policies are those that can generate long-term sustained funding sources that can provide the right amount of cost-share and programmatic support to transform the market over time. Unfortunately, these policies are the most complex and difficult to implement through legislative process.

Nonetheless, several interesting examples of biomass thermal energy policies from around the region are provided in Appendices A-D that can serve to help other states as they consider the best policy options.

Question 4: ***What are key next steps for advancing biomass thermal energy policy in the Northern Forest region?***

In order to develop a systematic approach to pursue both the more complex and the "low-hanging fruit" policy options in each of the states in the Northern Forest region, BERC recommends the following action items:

- Pursue sales tax exemption for high-efficiency biomass heating appliances and local biomass heating fuels in all NF states (except New Hampshire).
- Pursue state income tax rebate programs for the purchase and installation of biomass heating equipment in each of the NF states (except New Hampshire) and use this state action to demonstrate support for federal tax rebates for biomass thermal.
- Pursue official and visible adoption of pro-biomass thermal LBE policies by state and local governments in NF region.
- For states with an RPS in place, broadening eligibility for RECs from thermal sources is one policy option that should be pursued. For thermal inclusion in RPS policies to have the desired effect, state PUCs should adopt strategies such as issuing multi-year "strips" of thermal RECs if this payment is to be helpful toward securing project financing.
- For states without an RPS (such as Vermont) or for states that don't wish to further complicate an existing RPS, assessing the equivalent of an SBC on heating fuels that supports both energy efficiency and the use of biomass thermal energy can be pursued
- As state renewable policies are developed and specific targets are set, ensure that any specific targets be set with careful consideration of the sustainable biomass resource potential.
- If rebate programs are pursued, ensure long-term, stable funding sources and provide the optimal level of rebate to effectively stimulate fuel switching without over paying and creating long-term market expectations of and dependency on subsidization.
- Look to European countries such as Austria and Germany provide helpful examples of how balanced approaches, combining incentives, regulations, and programmatic support can drive development of a clean, low-emission biomass heating industry.
- Biomass thermal sector should team up with solar thermal sector for a stronger collective voice to advocate for renewables in the thermal energy sector.

APPENDIX A – Massachusetts SB 1593

APPENDIX B – Maine 126LR1271(01)

APPENDIX C – Vermont S.293

APPENDIX D – Massachusetts H.3897