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# The Governor's Wood-to-Energy Task Force Report



September, 2008

## **The Governor's Wood-to-Energy Task Force Report**

The Governor's Wood-to-Energy Task Force (Task Force) was first convened on January 30, 2008 and was tasked to investigate and eventually recommend strategies that could provide the citizens of Maine relief from both the dependence upon and the cost of traditional energy by sustainably utilizing the forest resources that exist in the region. After several meetings the Task Force adopted the following mission statement.

### **MISSION**

The Governor's Task Force on Wood to Energy was established to identify, evaluate and promote the economically advantageous use and development of sustainable wood-based alternative energy resources and technologies by capitalizing on the abundance of Maine's forest resources. The Task Force will evaluate the economic, environmental and public health impacts of forest-based energy alternatives and will provide recommendations to reduce energy costs, reduce reliance on foreign oil, develop and preserve new and existing markets and ensure the responsible stewardship of Maine's forest resources. The Task Force shall also examine European technologies and resource management, drawing lessons from their existing markets.

### **Abstract**

**The recent trend in heating oil prices is having a devastating effect on Maine's economy. The conversion of homes and businesses to modern, efficient, and clean wood fueled heating systems has many advantages that can mitigate the economic challenges; but the increased reliance on Maine's forests also requires attention. There is a strategy that can achieve increased energy independence and maintain the well being of Maine's forests and the industries that rely upon them.**

**Maine can show the nation how to make green energy. This report shows the way.**

The following pages detail the outcome of the Task Force's investigations and conclusions. The material on the following pages is based on the presentations, both written and spoken, of many experts representing a broad cross section of stakeholders. The material also draws upon less formal testimony from members of constituencies affected by the wood-to-energy initiative who have attended the meetings. Accompanying this document are supporting documents that provide background and corroboration for the factual statements and the logic behind the conclusions.

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## Introduction

The Task Force's title and its mandate provided a focus for the investigations and the direction of the strategic planning efforts. The boundaries of this report's content are set by the concerns for energy costs, uses, and environmental effects within the context of shifting some proportion of that energy use into wood based sources.

The current cost of fossil fuels has made the creation of a strategic energy plan critical as a long-term goal and as a very near-term solution to a crisis for Maine citizens. Maine needs to diversify its fuel base. Currently, Maine has the highest dependence on #2 heating oil of any state in the nation. Over eighty percent (80%) of Maine homes use oil-based heating systems. Maine households' annual consumption of #2 fuel oil runs at about 400,000,000 gallons per year. Maine's commercial buildings on average use an additional 100,000,000 gallons per year. Maine's households spent over \$1.37 billion last year for #2 heating oil<sup>1</sup>. Every dollar increase in heating oil prices shifts another \$400,000,000 per year out of Maine's homeowners' incomes. Businesses suffer an additional cost of \$100,000,000 per year. A significant proportion of that half a billion dollars per year leaves the Maine economy.<sup>2</sup> The loss of this potential commerce has multiplier effects that are far greater than the half a billion dollars per year of foregone consumption in Maine and is causing harm to the Maine economy and hardship to its citizens<sup>3</sup>.

Heating costs are presently also a difficult challenge for capital budgeting in state and public facilities. Schools in particular are under intense capital pressures due to their increased heating costs and the tight state and municipal budgets. Maine's schools consume about 15 million gallons of heating oil resulting in an annual cost of more than \$60 million per year at current prices<sup>4</sup>.

The need to shed reliance on foreign oil and create alternative energy sources has never been more apparent.

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<sup>1</sup> Based on data from the Energy Information Administration, 2007, the US Census, 2006, the Energy Information Administration, Distillate Fuel Oil and Kerosene Sales by End Use, #2 residential use, Maine [http://tonto.eia.doe.gov/dnav/pet/pet\\_cons\\_821use\\_dcu\\_SME\\_a.htm](http://tonto.eia.doe.gov/dnav/pet/pet_cons_821use_dcu_SME_a.htm).

<sup>2</sup> The "Final Report of the Commission to Study Production and Distribution of Biodiesel in New Hampshire," November 1, 2007, page 28, shows that for New Hampshire 85.5% of every dollar spent on heating oil leaves the state. 57% of the cost of heating oil is the cost of the crude oil from which it is refined (based on EIA data) suggesting that a significant portion of heating oil dollars not only leave the state but also leave the country.

<sup>3</sup> See "The Benefits to the State of Maine of Providing Tax Incentives for Heating System Efficiency Improvements" in the supporting document for details on the expected benefits to Maine's economy of converting old inefficient systems to modern efficient systems (using oil, wood pellets, or cordwood for fuel). Also see "The Economic Impact of Converting to Wood Pellet Fuel in the State of Maine" in the supporting documents for details on the expected positive impacts to the Maine economy from the conversion to wood pellet fuel.

<sup>4</sup> McCormick Facilities Management, July, 2008.

In any discussion of wood-to-energy, the foremost concern should be the continued conservation and sustainable management of the forest resource that has served and will continue to serve Maine. Sustainable practices include: considerations of the ratio between harvests and growth of a forest; environmental considerations like the protection of water quality; ecological factors that include the stewardship, creation and the protection of wildlife habitats.

Although not within the purview of this report, it is important to stress that there is a prioritized hierarchy of actions that contribute to reducing Maine's aggregate reliance on energy no matter what its source. At the top of this list are the combined benefits of energy efficiency and energy conservation. The first line of defense against the escalation in the volume and the cost of energy consumption should be the adoption of energy efficiency strategies that are readily available to Maine's homeowners, businesses, and industries. The most efficient strategy for dealing with rising costs and usage are weatherproofing and insulation improvements. This Task Force therefore suggests that any energy strategy adopted by the State include a comprehensive plan for decreasing waste through heat loss in homes and businesses. The Task Force suggests that every department within Maine state government pursue efforts to increase conservations, efficiency, and alternative sources of energy.

While reducing our dependency on fossil fuel we should not incur negative public health or environmental consequences<sup>5</sup>. For example, we could diversify our residential fuel base in very unhealthy ways by relying more intensely on existing older high polluting non-EPA certified outdoor wood boilers<sup>6</sup>. The Task Force is also concerned that high heating oil costs will shift more homes and small businesses into the use of already installed older highly polluting wood stoves. This is not only an air pollution concern but also a more general public safety concern over the potential for increased chimney fires that are caused by the incomplete combustion products that older stoves are more likely to create.

Furthermore, although it is beyond the scope of the Task Force's mission to examine diversification of Maine's energy sources as a whole, it is important to place this report in context by acknowledging that wood energy is only a part of any solution to Maine's energy needs. Ultimately, this issue can only be addressed through a comprehensive energy policy that considers numerous alternative energy sources and the optimal application of those solutions that best meets the unique needs of each energy user.

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<sup>5</sup> On July 23, 2008, Jim Brooks, DEP's Air Quality Bureau Director, stated to the Task Force that a wholesale conversion of Maine homes and small businesses to wood-based heat energy using new efficient technology could improve air quality in Maine. "Using wood as a renewable resource is beneficial; it lowers the carbon footprint; our climate change action plan includes increasing the use of renewable energy to displace fossil fuels." Brooks encouraged the Task Force to find ways to bring new, cleaner wood burning stoves and boilers on line soon. "How do we get the new technologies installed as quickly as possible so people can burn wood with the new technology? We need to accelerate the curve to get the new technologies in."

<sup>6</sup> The Maine DEP has adopted a legislated outdoor wood boiler rule (Chapter 150) that does allow the installation of new OWBs that are EPA certified.

The Task Force has listened to discussions regarding the technologies for wind power and tidal power as well as the costs to implement solutions such as solar and geothermal. The Task Force also considered the speed at which a positive impact for Maine's citizens could be achieved and the ability of the solutions to stand on their own in the marketplace without the need for governmental support. The Task Force wanted to be sure that a wood-to-energy strategy:

- Contains a relatively low set of barriers for a rapid but safe and economically and environmentally responsible deployment;
- Contains incentives for rapid results in moving Maine toward energy independence.
- Contains concrete suggestions for helping find relief to Maine's homeowners and business owners from the increasing burden of heating fuel costs.

After considering these criteria, the Task Force feels that the implementation of a comprehensive wood-to-energy strategy for the state of Maine will provide significant benefits to the citizens of Maine in the very near term and that the strategy can be implemented without compromising the stewardship of the forest resources of Maine.

### ***The Wood-to-Energy Task Force Process***

The Wood to Energy Task Force, established by Governor John Baldacci, and chaired by Leslie B. Otten, began its regular meeting schedule on January 30, 2008. The group has met for two hour sessions, generally from 10:00 a.m. to noon for a total of 15 sessions. The meetings have been well attended by Task Force appointees or their representatives and by other interested parties.

Sessions have generally included an initial presentation delivered either by a stakeholder from the Task Force or an expert in a field related to the question at hand followed by far-ranging discussion and debate about matters related to the use of some of Maine's biomass for energy.

The meetings have included input from a variety of stakeholders that span the wood-to-energy value chain from the growth of trees in Maine to the use of wood-based fuel in homes and businesses and even to the emissions produced by the use of combustible fuels that affect the air quality of everyone in the State. In order to have a comprehensive understanding of the impacts of a wood-to-energy strategy, the Task Force has investigated both the internal and external costs of converting wood to energy. To facilitate and understand these costs, the meetings have had presentations and statements from a variety of sources including the Maine Department of Conservation, large and small land owners, loggers, the pulp and paper industry, the environmental community, wood pellet manufacturers, experts in alternative woody crops, economists, and the American Lung Association of Maine.

The Task Force has circulated detailed minutes from every meeting and has also produced documents that contain the materials discussed. The Task Force has also periodically circulated draft documents

that summarize the understanding of the group in order to check the facts and gain consensus on conclusions.

The Task Force also conducted a two hour public forum on the evening of August 13, 2008 at the Burton M. Cross State Building and webcast the audio of that forum live. Copies of a draft of this report were made available in advance of that forum and at the forum itself. The notice of the public forum was widely reported in the media and is included in the supporting documents to this report.

Throughout this entire process and at the public forum, many valuable and thoughtful public comments were received. After discussion and approval, the Task Force has incorporated many of those comments or statements directly into the text of this report. The Task Force recognizes that it may not have fully satisfied every constituency that has presented their opinions and ideas. Many of the formal comments submitted to the Task Force were reflective of input that had been stated previously, had been discussed in depth, and in many cases were contributory to what was in the draft report that was made available prior to the public forum. All of the formal written comments received through the public forum process, even those not discussed or debated by the Task Force, are included in the supporting documents to this report.

The Task Force concluded its work on this document at a final meeting on August 27, 2008. The final changes to the document agreed upon at that meeting were incorporated into the document shortly thereafter.

## **Important Facts and Conclusions**

### ***--Maine is the Most Oil Dependent State***

Maine has the highest use per capita of residential #2 heating oil of any state in the nation. Approximately 440,000 households in Maine use on average 900 gallons per year of #2 oil. At the current average Maine heating oil costs of \$4.64/gallon<sup>7</sup>, the expected heating bill for this upcoming winter will be on average in excess of \$4,100 per household. This extreme reliance on heating oil makes Maine vulnerable to magnified negative economic effects from high oil costs. The aggregate cost for #2 oil in Maine, just for residences, is expected to exceed \$1.8 billion for the 2008-2009 heating season. Maine's businesses consume one hundred million gallons per year on average and are thus experiencing an increased cost of more than \$250 million based on the increase on heating oil cost over the past two years<sup>8</sup>. The expectation is that there will not be a return to cheap oil and therefore the burdens of high distillate fuel costs will continue to have a severe negative impact on Maine's economy.

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<sup>7</sup> From Maineoil.com, July 5, 2008. <http://maineoil.com/zone8.asp?x=0>

<sup>8</sup> Based on June 10, 2008 from <http://www.maineenergyinfo.com/oil/index.html> and EIA data [http://tonto.eia.doe.gov/dnav/pet/pet\\_pri\\_wfr\\_a\\_EPD2F\\_prs\\_cpgal\\_w.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pri_wfr_a_EPD2F_prs_cpgal_w.htm)

Maine also has the highest per capita output of residentially produced CO<sub>2</sub>, a primary greenhouse gas, of any other state in the nation. Each man, woman, and child in Maine produces in excess of 7,300 pounds of carbon dioxide every year<sup>9</sup>. This is directly correlated to the heavy reliance on #2 oil for heat.

Wood-to-energy can address both the cost burden on households and the cost to the environment. The cost for a BTU of energy from wood chips or wood pellets is about 25% or 50% the cost of the same BTU of energy from #2 oil<sup>10</sup>. Furthermore, based on assumptions noted in the next sentence, wood fuels have the potential to reduce carbon emissions to the atmosphere over the long term when compared to fossil fuels<sup>11</sup>. This statement is based on the expectation that Maine's forests will be harvested in a sustainable fashion so that trees can grow to maturity and perform their important role in the sequestration of carbon. The role of forests in sequestering carbon and how to manage them to maximize their ability to stop global warming is the subject of ongoing and intense scientific research that will likely have implications for Maine<sup>12</sup>.

## ***--Wood-to-Energy is Already Here***

### **- Cordwood**

Wood-to-energy is already a staple in Maine. But most of the wood is consumed in cut and split form in fireplaces, wood stoves, or outdoor wood boilers. Although modern wood stoves are more efficient and relatively clean, they require constant attention to loading and cleaning. Many of the older wood burning appliances have air quality drawbacks as well and will not solve Maine's reliance on heating oil while maintaining air quality. Many homeowners and businesses will not want to substitute the convenience of an automatic heating system for a manually fueled system that requires constant attention. Converting to cordwood fueled wood stoves will not replace primary heating systems. As heating oil costs remain high, there is expected to be a significant increase in the use of wood stoves as

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<sup>9</sup> CO<sub>2</sub> per capita is from the US EPA Energy CO<sub>2</sub> Emissions by State by Sector [http://www.epa.gov/climatechange/emissions/downloads/CO2FFC\\_2005.pdf](http://www.epa.gov/climatechange/emissions/downloads/CO2FFC_2005.pdf) divided by population from the US Census.

<sup>10</sup> At current (August 20, 2008) prices for wood chips, pellets, and #2 oil.

<sup>11</sup> With the assumption that Maine's forests will be harvested in a sustainable fashion so that trees can grow to maturity and perform their important role in the sequestration of carbon, wood chip fuels produce a net carbon output of about 20.5 lbs. of CO<sub>2</sub> per million BTU. Wood pellet fuels on average produce about 28.6 lbs. of CO<sub>2</sub> per million BTU. This is compared to home heating oil which produces 219.3 lbs. of CO<sub>2</sub> per million BTU. Based on data in

<http://www.pelletheat.org/3/2007SummerConf/PFI%20Net%20Energy%20Presentation%20July%202007.ppt>. It should be noted that the lifecycle analysis referenced in the URL was presenting at a pellet fuels conference and the research was conducted independently by the University of Wisconsin, Green Bay.

<sup>12</sup> See the June 13, 2008 issue of Science (<http://www.sciencemag.org/content/vol320/issue5882/index.dtl>) for a comprehensive set of articles on issues associated with the harvesting of wood and carbon.

a secondary source of heating for some homes. They are a viable wood-to-energy solution if they are modern, efficient, and clean burning and there is already a developed market for wood stoves and cordwood delivery in Maine.

Considering how widespread cordwood burning is in Maine, it is surprising that relatively little data on wood burning exists. Information is not available on such basic facts as: the age of woodstoves being used, the percentage of stoves in use that are EPA certified, the number of homeowners who heat only with wood, how much supplemental heat woodstoves provide, how much wood is burned each year and where it is burned.

It is also a concern that very little is known about the oil burners being used so commonly in the state and the interplay between oil and wood heat. The improvement in oil burner efficiency over the past decade is significant but the age of the oil burners in use in Maine today is unknown. This makes it impossible to estimate how much oil could be saved through burner replacement in addition to supplementation with wood.

The combination of increasing fuel oil costs, expensive gasoline and rapidly rising food costs have hit Maine people very hard. In the near term however, most Maine people will not abandon their oil systems and switch fuels. To supplement their oil burners, it is likely that more Maine people will turn or return to burning wood. If they are already burning wood, they will increase the use of their woodstoves for heat.

This situation presents potential serious public health concerns. The amount of air pollution emitted by woodstoves this winter could approach record levels. Maine's topography will contribute to this problem since many towns are located in or near river valleys.

Maine has already witnessed what can happen when wood burning is done in a manner that impacts the health and comfort of neighbors. Until this year, the rapid and unregulated expansion of non-EPA certified outdoor wood boilers produced dozens of complaints throughout the state and challenged the Maine Department of Environmental Protection's enforcement processes<sup>13</sup>. Given the emissions from non-EPA certified wood burning appliances and their relative inefficiency they are not a viable contributor to solving our dependence on oil in a healthy manner. The conversion of older non-EPA certified systems to modern EPA certified systems would contribute to lowering Maine's dependence on oil and would improve air quality.

Although the modern EPA certified woodstoves are more efficient and relatively clean compared to earlier models, they still require constant attention to loading and cleaning. Thus while increased use of cordwood fueled woodstoves will reduce our dependence on oil for heat, they are only a part of the solution and in many cases a limited one. Most homeowners and business will not want to substitute

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<sup>13</sup> The Maine Bureau of Air Quality now operates under Chapter 150 (see <http://www.maine.gov/dep/air/regulations/docs/chapter150final.pdf>) which establishes emissions standards and setback requirements and other requirements for the sale and installation of new outdoor wood boilers.

the convenience of an automatic heating system for a manually fueled system that requires constant attention. Cordwood fueled wood stoves will not replace primary heating systems for the vast majority of people. But they can continue to be a part of a viable wood-to-energy strategy. If the stoves in use are modern, efficient, and clean burning they can minimize air quality impacts and reduce our dependence on foreign oil. Also there is already an established market for wood stoves and cordwood delivery in Maine.

### **--Biomass**

The use of biomass made from bark and limbs that have no value for pulp, sawlogs, or clean chips has increased in recent years. The biomass harvest had fluctuated between 0.9 and 2.0 million green tons per year until the last two years of data. In the most recent year, 2006, the harvest was approximately 2.3 million green tons<sup>14</sup>. Biomass applications are commercial in scale. Biomass with bark and leaves is currently used in wood fueled electricity generation facilities, is used in pulp and paper mills for steam and electricity, and can be used in large scale central heating systems. Properly combusted, biomass is relatively efficient and clean-burning.

### **--Wood Chips**

For larger commercial applications, modern wood chip fueled systems can provide heat at a cost of less than half of #2 oil fueled systems. Modern wood chip systems are efficient and clean burning. They do require regular maintenance for cleaning but in a larger commercial application that is generally not an impediment to implementation. In district heating applications in which there is a central boiler facility that distributes hot water or steam to a system of users, wood chip systems are a viable wood-to-energy solution. Clean wood chips (no bark or leaves) are also used for pulp production.

### **--Wood Pellets**

The use of wood pellet fuel has already made inroads in Maine via wood pellet stoves and fireplace inserts. This segment of the market is growing rapidly. Pellet stoves are very efficient and clean burning. Wood pellet stoves need almost daily attention by the homeowner for fuel loading typically from 40 pound bags of pellets. The bags of wood pellets can be bought individually at local hardware stores or stove shops, or they can be delivered on pallets with 50 bags typically weighing one ton.

Fully automated wood pellet fueled home heating systems that use a boiler to heat hot water for baseboards and domestic hot water are common in Europe but not in the United States. For example, 80% of new homes in Sweden and 76% of new homes in Austria are now built with pellet fueled central heating systems<sup>15</sup>. These systems are transparent to the owner in that all they have to do is set the thermostat and the home or business is warmed to the setpoint. Pellet fuel is delivered in bulk from delivery trucks similar to oil delivery trucks into basement storage tanks that hold from several months

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<sup>14</sup> Maine Forest Service data.

<sup>15</sup> Data is from Pellets@las.info

to a full winter's supply of fuel. A cube seven feet on a side holds about a half a winter's supply for the typical Maine home. For that sized bin, compared to the typical 275 gallon oil tank, delivery frequency would be halved (reducing diesel use and emissions). These systems are also very efficient and clean burning. They use premium pellets<sup>16</sup> and thus produce about a cubic foot of ash for every two tons of pellet fuel.

Proven reliable and efficient pellet fueled boiler and domestic hot water systems with full regulatory approval for installation in homes and small businesses have recently become available in Maine. Commercially applicable systems for larger businesses, district heating plants and public buildings are also available.

The pricing of pellet fuels in the future has become a topic of interest for many homeowners and small businesses that have converted or are considering converting from oil to wood pellets. The cost of wood pellet fuel relative to oil is discussed in some detail in Appendix C.

### **--Cellulosic Ethanol**

The University of Maine at Orono has developed a process for removing hemicellulose from wood before the wood is pulped. This material can then be converted to ethanol. The manufacturing of a renewable liquid fuel produced from wood that could be used in transportation, generation, and heating would have very positive impacts both in terms of carbon emissions and energy independence. The project is still in the laboratory. There are no commercial operations for the production of ethanol from hemicellulose. Several pilot projects are starting up in 2008 based on sugar cane waste with the companies expecting to scale into other feedstocks at commercial levels sometime after 2010<sup>17</sup>. The potential benefits of hemicellulose ethanol are very exciting. As yet, the time it will take to make this process commercially viable is uncertain.

### **--Public Sector Initiatives**

There are a number of initiatives underway currently in the public sector that will serve as pilots for wood to energy conversions in larger buildings. This work also aims to help increase Maine's understanding of when wood energy is the best option for buildings, and which kinds of wood solutions work best in which circumstances and buildings. The Department of Conservation (DOC) in concert with other state agencies including the Bureau of General Services and the Maine Office of Energy, is developing a strategy for encouraging public buildings in the State of Maine to consider wood-based heat energy and is moving forward with the "Fuels to Schools" initiative. The lessons learned from these

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<sup>16</sup> Ash content is less than 1.0%.

<sup>17</sup> Annual Report of Verunium Corporation, March, 2008.

installations should be brought to the larger private sector efforts. Please see Appendix D for information on specific initiatives.

### ***--Maine's Forest Resources, the Pulp and Paper Sector, and Wood-to-Energy***

Any consideration of wood-to-energy needs to fully account for the impacts that the wood demand will have on the forest resource. The most recent data (2006<sup>18</sup>) shows that approximately 18.6 million tons per year of wood is harvested in Maine and about 17.2 million tons was processed. In aggregate, Maine is a net exporter of wood. Maine was a net exporter of sawlogs in 2006 (3.37 million tons exported, 0.9 million tons imported, and 7.40 million tons harvested). In 2006, Maine was a net importer of pulpwood (1.00 million tons exported, 1.54 million tons imported, and 6.26 million tons harvested)<sup>19</sup>. Maine is also an importer of biomass (2.33 million tons harvested, 0.36 million tons exported, 0.82 million tons imported). Currently, a small portion of the wood harvested in Maine (about 0.38 million tons per year) is converted into wood pellets. [See Appendix B for a brief discussion of the landowner's perspective.]

There is concern that an increasing demand for wood for energy will increase the price of the raw materials for pulp and lumber production. In particular, the pulpers and paper makers are concerned since the feedstock for pellet manufacturing and pulp production can come from the same grades of wood. In the current environment in which wood prices have spiked and mills are paying high prices to maintain supply, there is a heightened sensitivity to the potential of further price increases. Any potential threat to an industry that is so important to Maine's economy needs to be carefully evaluated.

According to the Maine Forest Service (MFS)<sup>20</sup>, if forest management and harvesting practices evolve<sup>21</sup>, Maine can, over time, increase sustainable and environmentally responsible yield per acre substantially above current levels. Changes in forest management and harvesting practices would increase the annual sustainable harvest by about 5.8 million green tons per year. (MFS also notes that another 3.8

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<sup>18</sup> Maine Forest Service Data

<sup>19</sup> Pulpwood is the kind of wood most likely to be use for pellet manufacturing. Maine also exported pulp (not pulpwood) in 2007 valued at about \$266 million. From the Maine Economic Growth Council by the Maine Development Foundation, February 2008.

<sup>20</sup> See "MFS Assessment of Sustainable Biomass Availability: Absolute Supply is not the Issue. Improving Utilization and Silviculture while Keeping Costs Low Are." July 17, 2008. Note that the assessment fully accounts for the need to apply well established standards for maintaining the sustainability of the forest resource. From page one, "MFS developed its estimate of available wood taking into account concerns for soil productivity, water quality protection, and biodiversity based on Maine's 'benchmarks of sustainability.' As a result, the maximum quantities available were discounted significantly."

<sup>21</sup> These changes include retrieving limbs and tops during existing harvesting operations, thinning stands that were previously considered not commercial, and intensifying forest management to increase yields. Achieving these increases will require departing from business-as-usual management and harvesting practices.

million green tons could be available for import from MA and NH. However, if wood based fuel use increases in other states in the region then the availability of exports may diminish.) This suggests that there can be enough wood in Maine in 20 to 30 years to eventually make a significant proportion of Maine's homes and businesses independent of imported oil without a demand induced scarcity of forest-based raw materials and thus without a demand induced price rise even if the pulpwood demand remains constant.

For example, if 10% of residences in Maine were to convert to wood pellet fuel, it would require approximately 650,000 tons of green wood per year to make approximately 340,000 tons of pellet fuel per year. The Maine Forest Service has shown that the Maine woods do have the capacity to sustainably produce wood pellet fuel at those levels both in the short term, by improving utilization by harvesting stock that is available but is not being harvested and/or by entering stands not previously considered commercial, and in the long term by implementing forestry management practices that increase the sustainable per acre yield of Maine's forests.

MFS also notes that a significant amount of wood not necessary for soil nutrient replenishment is being left under the processors. The economics of getting that wood to market are difficult due to the required investment in equipment. The move from skidders/chain saws to mechanical configurations have allowed efficiencies in hiring, safety, and the ability to harvest more wood with fewer people; but higher oil costs and the more diversified demand for wood products as a fuel source require that those difficult economics be solved so that less of the wood is left behind.

The economic viability of harvesting this additional fiber is important to consider. Factors that determine the costs of bringing wood products to market are resource protection zoning, stumpage values, and distance to market. In addition there are regional differences in supply with a greater surplus of residual wood in northern Maine verses central and western Maine.

The markets for wood are evolving as wood-to-energy takes hold. This is creating a new set of competitive dynamics that are both opportunities and threats to the various members of the Maine forest products community. These challenges are not insurmountable, but they are important to consider in order maintain stability and consistency in wood prices for all of the users of Maine's forest products.

The approximately 340,000 tons per year of wood pellet fuel that would be required to warm 10% of Maine's residences is less than the existing capacity of the pellet mills already operating or soon to be operating in Maine<sup>22</sup>. In order to compensate for that additional demand for wood, assuming no change in demand for pulpwood from the pulp sector, continued exports of pulpwood at current levels, and a

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<sup>22</sup> Mills in Athens, Strong, and Corinth Maine have a combined design capacity of 400,000 tons per year of wood pellet fuel. Athens and Corinth are currently producing about 100,000 tons per year each. The Strong facility will be online by winter and is expected to produce about 100,000 tons per year. All three plants report having secure wood supply arrangements.

return of the lumber business to pre-housing bust levels, Maine would need to increase its annual harvest by about 0.68% per year for the next 5 years. That level, according to the Maine Forest Service, is sustainable and achievable.

The availability of wood for energy in Maine for homes and businesses equivalent to 45,000 Maine households (about 10% of Maine's residences) is also supported by data on the pulpwood harvests. The Maine pulpwood harvest in 2006 was 1.1 million tons per year below its most recent peak in 1995 and has been declining by, on average, about 16,000 tons per year since 1990<sup>23</sup>.

To facilitate the maximization of Maine's sustainable harvest, cooperative efforts should be pursued to aggregate parcels and jointly contract for cutting and/or marketing of wood. Many plots are small, but multiple small plots in proximity may make for more attractive and cost-effective harvests. Furthermore, public education should be enhanced for new owners and those who inherited land showing that forest management for harvesting can be compatible with their other goals such as recreation and conservation.

In order to further develop Maine's wood-to-energy potential, there is also a real potential for cultivating fast growing woody crops similar to those currently grown in northern Europe on fallow farm land in Maine. This would also provide support on the supply side of the wood products sector. See the supporting documents (Woodstone Report – Growing Fiber) for details.

The Task Force, with very serious consideration for the well being of the pulp and paper industry in Maine, realizes that too rapid a transition from oil based heat to wood based heat could have negative impacts to that industry. The Task Force also knows that the increase in forest yield, with sustainability and environmental stewardship as guiding principles, is indeed a long run process. [See Appendix A for a discussion of the market forces that will prevent overharvesting.] These considerations are balanced with the clear and present threat to Maine's economy from its dependence on costly imported oil.

### ***--The Wood Harvesting Infrastructure***

The availability of wood does not necessarily mean that the wood can come to market. The Task Force understands how cultivating the growing, harvesting, and transportation of wood in Maine are important in terms of the health of the logging and transportation components. And this understanding can have a direct impact on the harvesting and use of wood that is currently available for harvest but is not being harvested. The reasons for that are complex and are in part due to the high fuel costs that loggers and truckers are currently facing<sup>24</sup>. However, the distress in the logging sector is also due in part to the short-term nature of the wood market. Pulp mills' demand has been unpredictable from the

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<sup>23</sup> Maine Forest Service data.

<sup>24</sup> It takes a mechanical operation, on average, about 6 gallons of diesel for every cord cut. About 2/3 are in the woods and 1/3 on the highway. Source: Sandra Brawders, Executive Director, Professional Logging Contractors of Maine.

point of view of the loggers. Mills are also carrying less excess inventory. Long-run supply agreements with known prices are less common than they were in the past. This uncertainty, coupled with a relatively undiversified market for pulpwood grades of wood, makes financing decisions for investments that often approach one million dollars or more challenging and very often impossible to act upon. As a result, the number of loggers in Maine has dwindled and continues to decline. The recent history of pulp and paper mill closings<sup>25</sup>, primarily due to global competition and the decline in demand for newsprint, only adds to the uncertainty and to the importance of cultivating an adequate, reliable, and consistent wood supply with the goal of reducing price volatility and maintaining pulpwood price growth at or below inflation. Maine's forest-based raw materials must remain priced at a level that is mutually beneficial to all stakeholders including the citizens of Maine who will come to rely on wood-based fuels.

There is a perceived risk by components of the wood supply-chain when considering very large investments that have ROI calculations based on cash flow assumptions that run far into the future. The development of a reliable wood-to-energy market will create another off-take channel for non-sawlog grade clean wood. That channel will have a known expected annual demand as homes and business convert their primary heating from oil to wood fuels. Wood pellet fuel manufacturers and wood chip suppliers should be able to engage with land owners, loggers, and truckers in long term agreements with prices that allow everyone in that value chain to plan, invest, and gather a reasonable return on investment while providing low cost heating fuel to the citizens of Maine.

The dwindling number of loggers in Maine needs focused attention. These loggers represent the core infrastructure for bringing forest products to market. Recent changes show a dramatic shift in production from skidders and single operators to crews operating multi-equipment configurations. The production per logger has dramatically increased, but so has the capital expense of the equipment. While there are fewer loggers the level of harvest has remained the same during this transition.

A disturbing trend (also witnessed within wood manufacturing facilities) is that the average age of loggers is increasing indicating a growing concern about the lack of new replacement workers. The anecdotal evidence presented to the Task Force suggests that fewer young people are choosing to work in the woods. More stability and less uncertainty from the demand side will help create a more enticing and consistent pay expectation. But the forest products industry in partnership with the State needs to educate youth on the benefits of a career wood harvesting.

Immigration is also a serious factor in logging infrastructure in Maine. In the northwest regions of the north Maine woods approximately 600 bonded Canadian laborers have been long-term operators of logging equipment in Maine. It is estimated that they produce 20-25% of the volume of annually harvested wood. These H2B bonded laborers are part of a program caught up in the national debate on immigration reform, and similar to the shortages from these workers in Maine's hotel industry, fewer

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<sup>25</sup> According to information from the Maine Forest Products Council, Maine has been less impacted than the surrounding states and provinces.

loggers are available currently until the program is extended for additional years. 600 loggers out of an estimated 2500 – 3000 total loggers is a significant shortage in logging capacity.

Entry level logging equipment operators earn on average \$11.07/hour<sup>26</sup>. The rates vary from as low as low as \$10.59/hour in Penobscot County to as high as \$13.09 in Piscataquis County. The Professional Logging Contractors of Maine have been working to raise wages to \$17.50 to \$19.00 per hour with full benefits. They feel that at “those rates that young people would consider the horrible hours and the lack of community respect for the necessity of the profession”<sup>27</sup>.

The transportation infrastructure in Maine needs to be optimized for the needs of the forest products industry. Rail integration issues that lower the efficiency of the movement of wood products need to be addressed. Trucking regulations should be reviewed and sections in which changes in the regulations will not negatively impact the highways or safety but will facilitate the cost effective movement of wood products should be rewritten.

### ***--Summary of Important Facts and Conclusions***

As with any good or commodity, the price of wood fuels will depend on supply and demand. If the demand for wood increases more rapidly than supply, wood prices will rise. If the demand for wood fuels rises more rapidly than supply then wood fuel prices will rise. The balance between the growth of the wood-to-energy sector and the ability of the harvesting infrastructure to bring the wood to market must be considered as a keystone in securing price stability. However, the wood-to-energy sector will grow based on the demand from the consumers not on some mandate from government. Thus the government must act to facilitate the sustainable supply of wood and wood fuels to meet demands for all stakeholders that depend on Maine’s most valuable renewable resource (see the “Suggested Policy Items” below for details). The stakeholders include the pulp and paper sector, the lumber production sector, the wood fuels manufacturing sector, the wood fuels delivery infrastructure, and the homes and businesses that will make Maine more energy independent and environmentally responsible.

## **Wood-to-Energy Task Force Consensus**

The Task Force has assimilated the information that is summarized above and is substantiated in more detail in the supplemental documents. Based on the facts, concerns, and stories heard at the meetings, the following points of consensus have been derived. Note that the numbering does not imply a ranking in terms of importance (with the exception of one through three which are in bold signifying their overarching importance).

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<sup>26</sup> Data from Maine Dept. of Labor, 2006.

<sup>27</sup> Sandra Brawders, Executive Director, Professional Logging Contractors of Maine

1. **Improving the energy efficiency of all buildings as well as the implementation of conservation measures should be promoted simultaneously with any conversion to wood fuels.**
2. **Any solutions should provide a net benefit to Maine's air and water quality and should not have a negative impact on the healthy forest ecosystem.**
3. **A long run goal is to increase the reliable, consistent, and sustainable supply of wood while maintaining the environmental standards that are important to Maine's forests from the perspectives of industry, tourism, and the ecosystems of which they are a part.**
4. An educational campaign highlighting the return on investment for weatherization, fuel efficiency, and fuel switching is an important component of this initiative.
5. The sustained high prices for heating oil will cause more homes and businesses to supplement their heating needs by burning cordwood in old, inefficient, and polluting wood stoves and boilers. The expected pollution and fire hazards that this will cause should motivate the State to act quickly to mitigate this problem.
6. Cost effective and environmentally compliant wood fueled solutions for buildings in Maine can come in various forms including cordwood, chips, pellets and other still in development.
  - a. A wood-to-energy solution that can have a significant impact on Maine's economy in terms of penetration into the typical home and business is the replacement or supplementation of #2 oil fired home and small business heating systems with pellet fueled heating systems. At this time, wood pellets are the only wood based fuel that can operate in fully automated residential boilers.
    1. Regulatory issues for the safe installation, maintenance, and certification of these systems must be addressed to make this a reality.
  - b. There are currently UL and ASME<sup>28</sup> approved fully automated pellet fueled systems available in Maine that can be installed in homes and small businesses under current codes and rules by properly licensed technicians. Pellet fueled systems for homes and small businesses have significant advantages over other solid fuels because of wood pellets' consistent size, density, low moisture, and renewable fiber base. Pellets are a refined wood fuel that lend to automated handling and combustion, and are the cleanest burning of all solid fuels<sup>29</sup>. Some of these systems are fully transparent to the

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<sup>28</sup> Underwriters Laboratories Inc - (UL) is an independent, not-for-profit product safety testing and certification organization based in the USA. UL marking indicates that the product conforms with the safety standards laid down by Underwriters Laboratories. ASME is the American Society of Mechanical Engineers. They certify boiler standards to assure that pressure vessels are safe.

<sup>29</sup> See [www.pelletfuels.org](http://www.pelletfuels.org).

owner and the transition is seamless. Just like oil fired systems, the owner only has to worry about where to set the temperature. The systems interface with existing circulating hot water systems to provide warmth to radiators or baseboards as well as to provide for domestic hot water.

- c. For larger applications such as schools, hospitals, and larger buildings, modern wood chip systems can have a significant impact on the cost of heating. Wood chip fuel is currently (August, 2008) 25% the cost of heating oil.
7. The ability of the private sector to provide pellet fueled heating systems for use in homes and small businesses and wood chip fueled heating systems for larger applications should not be impeded by regulations that were created for older solid fuels systems. Complementary to that is the development of the delivery infrastructure to supply wood pellet fuel and wood chips to Maine's end users. Fuel delivery trucks, whether oil or wood fuel should operate under the same rules.
8. As a model for the private sector, the State should continue to pursue the conversion of public buildings, schools, and hospitals to using modern and clean wood fueled systems. The Department of Conservation has already engaged in some conversions and the Bureau of General Services is also engaged in developing alternative fuel conversions (see appendix D for specific details).
9. The Maine Forest Service states that there is currently a growing inventory of wood that can be sustainably harvested to supply the conversion of 45,000 homes and small businesses in Maine to wood fuel (10% of Maine's heating oil users) over the next 5 to 7 years<sup>30</sup>. Additionally, MFS analysis demonstrates sufficient supply to provide for an increase to wood fueled boilers for larger businesses and central heating systems. The conversion of homes and businesses from fossil fuel to wood will place additional demands on the wood supply. A major opportunity exists if investments are made in harvesting infrastructure that would continue to sustainably harvest supply while taking advantage of existing inventory to supply current wood-based industries and emerging wood to energy industries. Current market conditions at the time of this report have caused tight wood supply and high fiber prices. In the next section of this report outlining specific policy recommendations, the Task Force strongly recommends that the State of Maine take actions to encourage investments to improve sustainable harvesting infrastructure.
10. Long run price stability, from green wood to end products, be they pulp, lumber, chips, or pellet fuels, should be an overarching consideration on any program or legislation. Although the most significant economic impact to the State comes by keeping the money spent on wood fuel inside

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<sup>30</sup> See discussion under "*Maine's Forest Resources, the Pulp and Paper Sector, and Wood-to-Energy*".

the State, the importation of wood, chips, or pellets from other states and Canada may be necessary in the short run to maintain the supply and demand balance for Maine wood costs.

- a. The sustenance and development of the harvesting and transportation components that move wood from the forest to the users are important to price stability.
- b. Because of the dwindling numbers of people who choose to work in the Maine woods, it is important that an educational campaign focused on meeting the current and future needs of the industry by highlighting the benefits of working in the wood harvesting business be implemented.
  - i. The educational program should begin with young children, and provide evolving awareness as youth progress through their education so that some young people can aspire to careers in which they provide the raw materials for a significant portion of Maine's industry .
  - ii. As wages and conditions continue to improve, the benefits of working in the wood harvesting business can be highlighted. Maine's workforce has a reputation for high quality work, stellar work ethic, and productivity. These qualities apply to those who work in the woods as it does to workers employed in our other trades and occupations. Promoting the skills and dignity of wood harvesting professionals will encourage young women and men to pursue a career in wood harvesting and related occupations.
- c. The effectiveness of current transportation infrastructure in the State can be improved. The integration of rail lines to the needs of the forest products industry as well as trucking regulations that impact the ability to cost effectively transport wood are a source of inefficiency. The protection of the transportation infrastructure and safety should not be compromised; but if changes can be made that do not impact those concerns they should be implemented quickly.
  - i. Decisions by the railroads to serve the industry are based on quantity, sources and destinations of the raw materials and the finished products. There are currently bottlenecks in the railroad system causing producers and suppliers in the wood products industry to use the trucks, a method that consumes more fossil fuel at a time when our dependence on foreign oil requires a dramatic change in the consumption patterns in the State, region and nation. Shipping wood products by rail can reduce Maine's dependence on imported oil.
- d. Programs that enhance the supply of Maine's primary natural resource; from the growing of the wood to the delivery of the wood for industrial users are important to the State's economic well-being. This means that landowners, loggers, truckers, and rail owners need to be considered when formulating recommendations.

11. There is the potential of creating renewable liquid fuels for transportation, power generation, and heating from wood and woody crops. Other forms of wood-to-energy such as cellulosic ethanol and bio-oil are potentially a part of the strategy.
12. The development of a strategy for the growing of woody crops that can produce high per-acre yields in areas that have traditionally been used for growing potatoes that have gone fallow would benefit Maine<sup>31</sup>. Likewise, the cultivation of fast growing grasses that are able to grow in Maine's climate that can be used to make pellets or as a feedstock for liquid fuels production with yields of up to 10 tons per acre per year should be a part of the wood-to-energy strategy.
13. There are many forms of alternative energy that can help make Maine energy independent and they should continue to be evaluated.

## **Wood-to-Energy Task Force Suggested Policy Actions** *(numbering does not imply ranking of importance)*

- 1) Before fuel switching, homeowners and businesses should have incentives for energy efficiencies and conservation from comprehensive energy audits and subsequent weatherproofing, insulation and the conversion to modern efficient heat sources<sup>32</sup>.
  - a) The State, in partnership with lending sources, should help homeowners and businesses understand, in straightforward terms, what programs are available to facilitate the implementation of efficiency, conservation, and fuel switching measures
- 2) The sustained high prices for heating oil will cause more homes and businesses to supplement their heating needs by burning cordwood in old, inefficient, and polluting wood stoves and boilers. The expected pollution that this will cause should motivate the State to act quickly to mitigate this problem.
  - a. The state should regularly survey how Maine people are heating their homes and small businesses as well as how Maine municipalities and the state heat public buildings. The survey should include the age and types of systems in use as well as the type and quantity of fuel.
  - b. The Maine DEP and Maine CDC must take timely and effective action to respond to and resolve public complaints of wood smoke as a public health hazard/nuisance.

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<sup>31</sup> See <http://www.timberbuysell.com/Community/DisplayNews.asp?id=2968> for details about a pilot project in Vermont in which willows are reaching maturity in 3 years and 400 acres are yielding about the equivalent in wood chips of ½ million gallons of heating oil.

<sup>32</sup> See the report of the Governor's Energy Independence Task force for detailed analysis.

- c. Given the expected increase in the use of older, outdated, and improperly maintained wood stoves, the State Fire Marshall should emphasize the dangers of chimney fires and redouble educational efforts aimed at the prevention of wood stove fires.
- 3) Support for the supply side of the wood products industry that does not favor any particular stakeholder at the cost of another and does not degrade the sustainability of Maine's forests.
  - a) Financing for the harvesting infrastructure is a keystone to the modernization and efficiency of Maine's forest products industries. Improving existing and implementing new financing opportunities for investing in the infrastructure for bringing the raw materials to industrial users, sustainably, with least cost, and with the maximum efficiency, will require a comprehensive review and planning process.
    - i) **Recommendation:** *The Task Force recommends that a new panel, blue ribbon committee, or task force be formed with the specific mission of creating a strategic plan for optimizing Maine's harvesting infrastructure. The Task Force recommends that the group be kept relatively small and focused. However, at a minimum, the following should be members: Maine Forest Service, Maine Bankers Association, Maine Credit Union League, Maine Association of Community Banks, Professional Logging Contractors, Maine Forest Products Council, Coastal Enterprises, Small Business Administration, the Natural Resources Council of Maine.*
  - b) Transportation bottlenecks need to be corrected.
    - i) Currently trucks weighing up to 100,000 pounds are allowed on the section of the interstate from Kittery to Gardner. They are also allowed on most of Maine's two lane roads. The restriction for trucks on I-95 north of Gardner to 80,000 pounds creates both safety and environmental concerns. 100,000 pound trucks are forced to travel through small towns to avoid the interstate. Those that do run reduced loads on the interstate create higher emissions per ton carried.
      - (1) **Recommendation:** The 80,000 pound weight limit on all of Maine's Interstates should be increased to 100,000 pounds through the continued efforts of the congressional delegation, the Baldacci Administration and the trucking industry.
    - ii) Maine's rail system is a significant recipient of public funds invested in the system by the State. The State should work to make the rail systems better integrated to facilitate the movement of bulk materials both inter and intrastate.
    - iii) The State should engage the railroad companies in order to understand the reasons for discontinuities in the system.
    - iv) The State should investigate a strategy for providing incentives for new facilities in the wood products sector to be located for easy access to the rail system.

- v) The proposed general transportation strategies in the Governor’s Pre-Emergency Task Force report are reiterated below to underscore the Wood-to-Energy Task Force’s support of those action items.
  - (a) Provide relief to businesses that wish to connect to the railway system.
  - (b) Provide a revolving loan fund to promote business connections to local rail systems.
  - (c) Provide a truck efficiency tax incentives program to enhance energy efficiency for motor carriers.
  - (d) Expand the DOT Industrial Rail Access Program.
  - (e) Promote intermodal – freight/rail interconnections.
  - (f) Expand railroads into industrial parks.
  - (g) Expand the use of anti-idling technologies and programs.
  - (h) Promote Maine inter-modal ports such as Searsport, Bangor and Portland.
  - (i) Promote a robust rail and intermodal transportation system in the State.
  - (j) Expand container traffic at IMT-Portland.
- c) The State and congressional delegation should continue to support the efforts of the forest industry to salvage the H2B bonded labor program, while also ensuring that no willing and qualified US citizen is replaced by a bonded laborer.
- d) Research and development for fast growing woody crops on fallow farm lands.
  - i) The University of Maine system should seek funding for large scale R&D efforts to find ways to bring fallow farm lands in Maine into the production of fiber suitable for conversion to fuel. The use of fast growing farmed wood crops is common in Europe and their systems should be investigated for suitability in Maine’s growing environment. Indigenous species that are suitable for energy use and that lend themselves to farming and high yields should also be sought and researched.
- e) Existing educational campaign promoting careers in logging should be continued and new curricula should be developed and implemented to meet the current and future needs of Maine’s forest products sector.
  - i) The Maine State Community College System should hold a strategic planning session with a cross section of members of the forest products industry in order to plan curriculum offerings that are relevant to the needs of maintaining the sustainable yield of Maine’s forests.

- (1) Several recent attempts at promoting careers in logging include:
    - (a) The Western Maine Forestry Consortium that established a 4 week curriculum for students interested in logging (limited enrollment prevented implementation) and;
    - (b) The Northern Maine Community College program that included a 12 week course, \$17,000 paid tuition, and an opportunity to transition into permanent industry positions. Of 18 enrolled students, only one is currently employed in the industry.
  - ii) New efforts should be examined for cross training between multiple industries to diversify opportunities for students. For example, the construction industry is also experiencing a shortage of equipment operators. By combining resources for outreach and education students can be trained to operate either construction excavators or wood feller-bunchers.
  - f) The State and its representatives should encourage the Federal Government to significantly increase and stabilize appropriations to support State forest landowner assistance programs that encourage and enable landowners to invest in activities that improve the productivity and health of their woodlands.
  - g) The State and the private sector should develop pilot projects for cooperative efforts to aggregate parcels and jointly contract for cutting and/or marketing of wood. Many plots are small, but multiple small plots in proximity may make for more attractive and cost-effective harvests.
  - h) The State should support and strengthen existing MFS landowner outreach programs to:
    - i) Assist family forest owners in making informed decisions to improve the productivity and health of their woodlands and;
    - ii) To support increasing the acreage of family forest lands certified as sustainably managed.
    - iii) The Department of Conservation should work with representatives of family woodland owners, consulting foresters, and loggers to develop a strategy for improving an understanding of ways to reach family forest owners with appropriate messages about active stewardship of their woodlands. This work could include focus groups, public opinion surveys, and other means of identifying, testing, and promoting the message of good stewardship.
  - (1) “One stop shopping” for both information and permitting could be an incentive for some small landowners to bring their holdings into production.
- 4) Codes and rules changes that can facilitate the development of a wood fuel delivery infrastructure and the ability of homeowners and small businesses to get systems safely installed should be implemented.

- a) The Department of Professional and Financial Regulation’s expressed intention to comprehensively review and update residential and non-residential laws and rules governing solid fuels should be supported.
- b) Regulated metering of the pellet fuel delivery trucks to “legal for trade” standards (to be on par with oil delivery trucks).
- c) In the Maine Department of Transportation RULES AND REGULATIONS RESTRICTING HEAVY LOADS ON CLOSED WAYS, 5.E. under Exempt Vehicles, states “Any vehicle transporting home heating fuel (oil, gas, coal, stove size wood)” to a private residence may apply for an exemption certificate to allow travel on posted roads. Adding wood fuel to the parenthetical list of fuels would remove any question about the acceptability of pellet or chip delivery trucks applying for exemption from road postings.
  - i) **Recommendation:** *Include “pellet or chip fuel” in the parenthetical list of example fuels in 5.E. under Exempt Vehicles.*
- d) State adopted codes for safe installation of heating systems, particularly those that run on solid fuel should be updated to address new heating technology that incorporates safety features.
  - i) Homeowners who want to install wood pellet fired boilers (not wood stoves) to reduce home heating costs may need to either disconnect their oil-fired boilers from an existing chimney or install a second chimney. Currently, NFPA Chapter 211 prohibits venting of two appliances using two different fuels in a common flue.
    - (1) **Recommendation:** *Allow common flue connection for oil and pellet fuel fired boilers under conditions stipulated by the pellet fuel boiler manufacturer in the appliance’s installation manual and provide information to the public about other options they may have other than installing a second chimney.*
  - ii) Current occupational licensing rules provide for three levels of licensure for oil burner technicians—apprentice, journeyman and master licenses. Only apprentice and master license categories are available for solid fuel technicians. In addition, the state rules require that apprentice fuel technicians may only work under direct supervision of a licensed master solid fuel technician. As more homeowners decide to install alternative heating systems, the absence of journeyman solid fuel licensee could become a barrier to installation. There is no doubt that the demand for the services of solid fuel technicians will increase dramatically in the next few years.
    - (1) **Recommendations:** *Create a journeyman solid fuel license and allow a licensed journeymen solid fuel technician to work to work under the indirect supervision of a master solid fuel licensee to install/service solid fuel boilers.*

iii) Pellet fired boiler systems are fundamentally simple and are only related to solid fuel, as it is commonly conceived, by definition. The boiler portion of the system is identical to oil-fired boilers, and the pellet burner is a simple, mechanical device. Permitting oil licensed technicians to install and service pellet-fired boilers after receiving manufacturer specific training on the pellet burner to be serviced would make pellet-fired central home heating systems much more accessible, in timely fashion, to Maine citizens.

(1) **Recommendations:** *Permit journeymen and master oil license holders to install/service pellet fired boilers under terms identical to those under which they install/service oil boilers once they have received manufacturer specific training on the pellet boiler to be serviced.*

iv) Solid fuel regulations require dump zones in heating systems to allow for the distribution of excess heat when the system overheats or the power is lost eliminating normal power-on circulation. This regulation is unnecessary for pellet-fired boiler systems since only a very small quantity of fuel is burning at any given time and a power outage would deprive that fuel of the necessary oxygen to burn vigorously. When deprived of a fan-driven oxygen supply, the pellets in the burn chamber will smolder until extinguished resulting in no excess heat that requires “dumping.”

(1) **Recommendation:** *Eliminate the dump zone requirement for pellet-fired boiler systems to 50kw (170,700 BTUs).*

- 5) Use of wood fueled systems in quasi-government supported housing both for current conversion and as standard in future development when it is cost effective.
- 6) The State should encourage providers of homeowner’s insurance to fully recognize all modern heating systems that meet UL (and in some cases ASME) approval that have been properly installed and use commonly accepted fuels as regulated by the rules and codes of the State as safe and reliable.
- 7) The State should craft programs to encourage the conversion of old polluting oil fired and wood fueled systems.
  - a) The State should investigate tax incentives targeted at helping homes and small businesses retire old inefficient and polluting oil and wood heating hardware. See “The Benefits to the State of Maine of Providing Tax Incentives for Heating System Efficiency Improvements” in the supporting documents.
  - b) The State should investigate the efficacy of a direct “buy-back” program that would give homeowners and small businesses a direct payment for retiring and replacing an old furnace/boiler or stove with a modern, efficient, and clean burning system. Programs in other

states, provinces, and municipalities<sup>33</sup> have had success in encouraging the removal and replacement of polluting inefficient systems.

- c) The State should educate its citizens as to the potential fire dangers from using old equipment and/or burning green wood that creates creosote. The State should also educate its citizens on the effects of pollution from older equipment on air quality and the health of its citizens.
  - d) The State should make its citizens more fully aware of any state or private loan programs such as “The Renewable Energy and Energy Efficiency Program” (see the fact sheet in the supporting documents) and should eliminate as many bureaucratic “red tape” hurdles as possible.
- 8) The State should continue and expand the demonstration projects that it has already begun (see Appendix D for details).
- a) Support the current work of the State Board of Education in developing an energy fund for public schools to undertake comprehensive energy projects, including incorporation of and conversions to wood fuels.
  - b) Support the current work of the Department of Education to continue and expand the incorporation of energy projects within the School Revolving Renovation Fund, including specific opportunities for schools to convert from oil to wood energy or other alternative energies.
  - c) State government should increase the technical assistance it can provide to public organizations seeking to convert from fossil fuels to wood energy. These efforts should be made by the Department of Conservation’s Public Working Group on Wood-to-Energy<sup>34</sup>.
- 9) The State should remain vigilant and proactive in protecting Maine’s air quality with respect to the emissions from all heating sources.
- a) Modify Maine’s public nuisance laws to assure that wood smoke as a public health hazard is acknowledged and that enforcement authority and responsibility at the local and/or state levels is clear.
  - b) Assure that Maine’s DEP has the ability to effectively monitor particulate matter throughout the State including the ability to investigate local complaints.
- 10) The Task Force does not suggest the funding of a specific position in state government.
- 11) With an increasing reliance on wood supplies as a source of heating fuel, the State should ensure that the long-run needs of the State from the perspectives of all stakeholders are strategically

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<sup>33</sup> See <http://www.epa.gov/woodstoves/changeout.html> for a description of buy-back programs, links to case studies, and links to program homepages.

<sup>34</sup> The vote on this language was 6-5 in favor of the members present, not unanimous.

protected while maximizing the aggregate welfare of the State. Those stakeholders include landowners, loggers, truckers, sawmills, chippers, pulp manufacturers, pellet manufactures, biomass facilities, Maine's wildlife and woodlands, and most importantly, the citizens of Maine.

- a) Examine opportunities to fully fund MFS inventory and disease and pest monitoring functions.

## **Members of the Task Force:**

Les Otten, Chair, Maine Energy Systems LLC  
Charlie Agnew Biomass Commodities Corp  
Doug Baston Small Woodlot Owners Assoc. of Maine  
Bill Bell Maine Association of Conservation Districts  
Ian Burnes Maine Office of Energy Independence  
Jack Cashman Governor's Office, Senior Economic Advisor  
Dana Connors Maine State Chamber of Commerce  
Paul Davis Plum Creek Timber Company  
Jim Delamater Northeast Bank  
Dutch Dresser Maine Energy Systems LLC  
John Fitzsimmons Maine Community College System  
Chip Gavin Bureau of General Services  
Doug Gardner Prof. of Wood Science, UMaine  
Jon Hinck Attorney/State Representative  
Wick Johnson Kennebec Tool & Die  
John Kerry Office of Energy Independence  
Sean Mahoney Conservation Law Foundation  
Dale McCormick Maine State Housing Authority  
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Ed Miller American Lung Association of Maine  
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Doug Smith Retired Attorney/State Senator  
George Soffron Corinth Wood Pellets  
Charlie Spies CEI Capital Management LLC  
Patrick Strauch Maine Forest Products Council  
Bill Strauss FutureMetrics and Maine Energy Systems

Peter Triandafillou Huber Resources Corp.

Keith Van Scotter Lincoln Pulp and Tissue

## **List of Resource Material** – (in no particular order)

Available on the Department of Conversation website

Mission Statement of the Governor’s Wood to Energy Task Force

Minutes of Governor’s Wood to Energy Task Force meetings

January 13, 2008; February 20, 2008; March 19, 2008; April 2, 2008; April 16, 2008; April 30, 2008; May 7, 2008; May 14, 2008

The Economic Impact of Converting to Wood Pellet Fuel in the State of Maine (PowerPoint)

FutureMetrics Summary Page of Economic Impact Report (FutureMetrics’ President, William Strauss, is a member of the Task Force and is also a partner in Maine Energy Systems)

Wood Pelletization – Forest Bioproducts Research Project – (PowerPoint)

Maine Forest Service Summary Page of Wood Pelletization report

State of the North American Pulp and Paper Industry: There is Light on the Horizon (PowerPoint)

Maine Forest Products Council draft of Concepts for Wood Energy Task Force

“Where will the Wood Come From” - DOC (PowerPoint)

Woodstone Report – Growing Fiber (PowerPoint)

Wood Supply Analysis – Maine Forest Service

CEI Cut to Length Conversion Loan Program

Implications for Dust Emissions – Environmental Impact Study

Report of “Wishlist Items” - Forest Products Landowners

Maine Future Forest Economy Project – DOC, Maine Forest Service

MFS Assessment of Sustainable Biomass Availability: Absolute Supply is not the Issue

Maine’s Forest – A Snapshot – DOC, Maine Forest Service

IEA Bioenergy Study on Global Wood Pellet Market

Northern Forest Biomass Plan

Pulp and Paper Industry – Report from Keith Van Scotter

Maine’s Wood Basket – Chart presented by Rosaire Pelletier, Governor’s Office

Maine Community College System Wood Pellet Heating Systems Technician Program Training Cost

The Benefits to the State of Maine of Providing Tax Incentives for Heating System Efficiency Improvements – Prepared by FutureMetrics for the Task Force. (FutureMetrics’ President, William Strauss, is a member of the Task Force and is also a partner in Maine Energy Systems)

Renewable Energy and Energy Efficiency Program – Farm Bill Section 9006 – 7CFR 4280 – Subpart B

Testimony by Mike McCormick on the use of wood chip fuel in State schools (July 23, 2008).

Harvest Systems - Certified Logging Professional Program - Mike St. Peter

Biomass Commodities - Solid Fuels Licensing

MESYS - Oil and Solid Fuel Board Considerations

Maine Department of Conservation Wood to Energy Initiative Survey of Heating Systems in Maine

Atlantica Bioenergy Study - Pricewaterhouse Coopers

Testimony from Director James Brooks, Maine Bureau of Air Quality

Maine Department of Environmental Protection: Control of Emissions from Outdoor Wood Boilers

Public Testimonies collected at the Public Hearing and through emails to the Department of Conservation

Letter to members of the Task Force from Governor John E. Baldacci

## Appendix A – Discussion of Sustainability and Wood Supply

(Thanks to Peter Triandafillou and Keith van Scotter for this information)

The issue of sustainability versus market opportunities is important, but the two do not have a simple relationship. Almost all land these days is disconnected from the mills and owned by investors. Regardless of their ownership time horizon, investors seek returns from both operating income and timberland appreciation. In order to sell timberland at the end of their tenure, they need to have something worth selling. This feedback mechanism is an effective tool to promote sustainability, creating an efficient market force to calculate a sustainable harvest level. This does not mean that everyone's interpretation of sustainability is the same, but over the long haul it is expected that this dynamic will work in Maine's forest's favor. For example, certain pulpwood products are in high demand, but we are not seeing a rush of landowners to increase harvest levels. Most large landowners calculate their harvest level over a long planning horizon, and they don't deviate from it significantly.

More importantly, when one goes up the value chain of products from low grade wood for energy feedstock, to pulpwood, then to logs, and finally high value logs one finds that the bottom of the ladder contains most of the volume but little of the value. The top of the ladder is in short supply but high in value. In most areas outside Maine, selling low value wood is a problem, forcing some landowners to sell only logs. It is not possible to practice good silviculture without access to markets for low grade wood. Rich, diverse markets for low grade material give landowners the tools to improve stand quality.

This is not to say that imbalances can arise, especially if a new class of non-residual wood consumer enters the market in a big way (in theory at least, pellets should have a high component of residual material from other mills). However, as long as the State does not engage in market distorting subsidies or attempt to allocate resources through policy, the market will correct any imbalances. Although the Maine forest has the capacity for increased production over time, in the short term, landowner forest models and logging capacity will act as a brake. In this situation mills with the best ability to compete will secure the resource. However, it is worth emphasizing that all consumers should be on a level playing field. The State should not give a market advantage to one consumer over another by subsidizing their operations or wood purchases.

Note also that in parts of northern Maine, there is currently little opportunity to market the tops and waste wood that is consumed by biomass boilers in other parts of the state. In addition, we have vast areas of young spruce fir stands that can benefit from an early thinning. These thinnings will produce a lot of low grade wood that will need a market.

Landowners of any significant size have 5 year plans that outline annual allowable cuts, and there are numerous regulations concerning harvest practices mandated by the State that in general provide that lands are managed sustainably. The penalties for landowners that do not follow practices are significant and given that many of them are also certified by third parties (SFI, FSC, ATFS) there is additional motivation to manage sustainably. Business people, including landowners, managers, harvest

contractors, etc., do not view regulations as optional; they are part of the license to do business. Of course there are cases where people or companies violate regulations, but this is as uncommon as it is newsworthy.

## Appendix B – The Landowner Perspective

(Thanks to Pat Strauch for this information)

In Maine 17.5 million acres of land is forested and primarily privately owned. There are many types of landowners but they can be generally separated into large blocks of commercially owned land (Northern and Eastern Maine) and by small woodlot owners (rural Maine)

From the commercial woodland owners perspective returns on wood products are greatest from quality sawlogs (both hardwood and softwood) with the least amount of return on biomass energy wood. Stumpage reports from the Maine Forest Service provide some perspective on the amount of money paid to a landowner contracting with a general contractor for wood cutting services

Maine Analysis of selected Stumpage prices paid to landowners

PRODUCT	STUMPAGE \$	CONVERSION To \$/TON
BIOMASS	\$1.92 TON	\$1.92
FIREWOOD	\$16 CORD	\$6
PALLET WOOD	\$60 MFB	\$12
PULPWOOD		
SPRUCE FIR	\$9 TON	\$9
HARDWOOD	\$5 TON	\$5
SPRUCE STUDWOOD	\$17 TON	\$17
SAWLOGS		
SPRUCE	\$135 MBF	\$27.0
SUGAR MAPLE	\$263 MBF	\$52.6
VENEER S. MAPLE	\$529 MBF	\$105.8

In Maine 2006 sawlogs represented 42% of the harvest volume; pulpwood 44%; and biomass 13%. While biomass and pulpwood are important markets for Maine landowners, the best returns are with the higher value sawlogs .

The addition of pellet markets in Maine will serve to diversify market opportunities for wood products as a low value markets.

## Appendix C – Wood Pellet Fuel Costs in Detail

(Thanks to William Strauss for this analysis)

Perhaps the most important source of uncertainty (and therefore perceived risk) for the homeowners and small businesses considering converting to wood pellets is the worry about the price of pellets in the future. The following question is heard very often: “What if I convert my home to use wood pellets and, because the demand for pellets is so high, the price of pellets rises so much that I would have been better off staying with oil?”

The following discussion breaks down the primary costs of manufacturing wood pellets and shows how the price of oil is linked to the price of wood pellets. To summarize what is shown below, oil prices have only a marginal impact on pellet prices. Thus if oil prices rise, pellet prices will rise also but at a slower rate. Thus the gap between oil and pellets in terms of BTU per dollar of cost to the end users will grow as oil prices rise. Conversely, if heating oil prices fall to about \$1.85 that gap will disappear<sup>35</sup>.

As long as the market remains competitive, the price to the end user will be determined by the cost of manufacturing. Short run supply and demand imbalances will cause short run price fluctuations. But in some cases, short run temptations to exploit supply and demand imbalances should be characterized in the same context as selling generators for three times their typical retail price after the ice storm; particularly when there is no underlying cost increase to the retailer that justifies the price increases (although not a legal consideration, the product is also vital to keeping a growing number of Mainer’s warm in the winter).

Wood pellet manufacturing has several important cost inputs<sup>36</sup>. The primary contributions to the variable cost of goods in pellet production are wood, labor, and electricity. Wood costs account for about 60% of the cost of goods. Electricity is about 12%. Labor is about 13%. Pellet manufacturing does not use fossil fuel (drying is done with wood as the fuel) except to operate loaders and forklifts (about 1% of the cost of goods).

With a well developed harvesting infrastructure and the fact that there is a known level of sustainable harvest (in other words, treat the forest like a perpetual bond and take only the annual dividend – see Appendix A above), the cost of harvesting wood is exposed to fuel costs; but only marginally. FutureMetrics has estimated that for every \$1.00 increase in crude oil prices the average price of

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<sup>35</sup> If the cost of wood did not fall as a result of the fall in oil price, the breakeven heating oil price is \$2.05. The model used to derive a breakeven of \$1.85 assumes that the cost of wood would fall enough to lower the market price of wood pellets to \$225/ton.

<sup>36</sup> FutureMetrics and William Strauss wrote a detailed financial analysis and cost model for the Berlin, NH wood pellet manufacturing facility. That facility will begin operation in spring 2009 at 100,000 tons per year and will ramp up to 400,000 tons per year within 5 years of startup. The Berlin, NH area lost two pulp mills in the last two years along with their demand for more than 1.2 million tons per year of round wood.

pulpwood to is expected to increase by 0.43%<sup>37</sup>. So if crude is up by \$100 dollars wood prices should rise by 43%. In other words, as long as there is investment in modern harvesting equipment, wood prices will not increase as fast as oil prices. Since wood costs are about 60% of the cost of pellet manufacturing, a \$100 increase in crude oil prices will pass through as about a \$25 increase in that component of the cost of manufacturing wood pellets (this assumes an average delivery distance of about 100 miles). The cost of electricity increasing as a result of higher natural gas and coal prices passes through as 12% of the cost of the increase. For example, if there were a 100% increase in electricity costs, the cost of pellet manufacturing would increase by 12%. Comparatively, the cost of crude is about 60% of the cost of home heating oil<sup>38</sup> and therefore a \$100 increase in crude will increase heating oil by about \$60. Thus, as stated above, the gap in dollars per equivalent BTU would be expected to increase if oil prices increase.

As an example, if wood prices to the pellet manufacturer are \$40/ton and electricity is \$0.08/kWh and labor rates are at competitive levels, a typical wood pellet facility can manufacture pellets for a cost of about \$115/ton. That includes all annual operating costs but does not include a required return on investment for investors or to repay debt. Most pellet mills in the region are wholesaling pellets for between \$140 and \$165 per ton. After typical transportation costs and retail markups the price to the end user is generally about \$240 to \$260 per ton. If wood prices rise to about \$60/ton that would increase the cost to manufacture by about \$35/ton and, holding other costs fixed, would increase the final price to about \$285/ton.

This “gap” that has been discussed above is currently very compelling in terms of driving the market. At current heating oil prices (July 5, 2008), the equivalent per ton price of pellets is about \$540. That is, if heating oil remains at \$4.65/gallon, pellets would have to cost \$540/ton or more for oil to be a less expensive source of heat. BTU’s from pellets are about 45% the cost of BTU’s from heating oil (assuming furnace efficiencies of 85% for both pellets and heating oil). Therefore there is currently a “run” on pellet appliances (stoves and fireplace inserts) with long waiting lists being the norm. There are also pellet supply concerns due to the fact that many retailers pre-buy and, this year, they did not order enough.

What then is the market clearing price for pellets at the retail level? If supply and demand is in balance, given current raw material and energy costs, that price is between \$240 and \$265 per ton. Based on the expected availability of wood supply in the region going forward, and ignoring general inflation, this is the expected long run price.

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<sup>37</sup> See “The Economic Impact of Converting to Wood Pellet Fuel in the State of Maine” in the resource material (PowerPoint).

<sup>38</sup> EIA, Residential Heating Oil Prices, January, 2008,  
<http://www.eia.doe.gov/bookshelf/brochures/heatingoil/index.html>

## **Appendix D – Specific Public Sector Initiatives**

### **Survey of Heating Systems in Public Facilities**

The Department of Conservation (DOC) has send an electronic survey to facilities managers and administrators of municipal buildings, hospitals, schools, and prisons statewide, in a effort to indentify publicly owned facilities in Maine where the utilization of alternative heating systems that operate on renewable fuel is feasible. The information obtained in the is survey will help the Department determine where there are opportunities to reduce the state’s dependence on fuel oil. This survey represents the State’s first step in accomplishing significant statewide reductions in fuel oil consumption to heat public buildings. The department is also working with the University of Maine system and the Bureau of General Services to assess their existing respective databases to gather the same information requested in the survey. The findings gleaned through the survey results and through the database assessment will be presented to Governor Baldacci along with a public sector report. The report may recommend a bond to assist public facilities with the installation and maintenance of wood-based energy systems.

### **Fuels to Schools**

Fuels-to-Schools is an initiative designed to help public schools and other public facilities reduce heating costs while increasing forest health. The program promotes the use of biomass heating systems (biomass boilers) that can burn waste wood from hazardous fuels reduction projects. The federally funded initiative was targeted originally to the Intermountain West, but its roots lie in Vermont. The USDA Forest Service seeks to obtain adequate funding from Congress to expand the program’s reaches.

The DOC, Maine Forest Service continues to move forward with the Fuels-to-Schools initiative. This is very closely related to all of the State’s other efforts. It s enables us to build relationship with those already invested in this areas and will facilitate our efforts going forward. The Maine Forest Service has contracted with the Biomass Energy Resource Center, a top expert in the area of wood-to-energy efforts in public institution, for a whitepaper providing a blueprint for the establishment of a Fuels-to-Schools program in Maine.

### **Wildland Urban Interface**

A Morebark 15” wood chipper is available for loan by the Maine Forest Service (MFS) for municipalities to reduce fuels through fire protection efforts. Both Mapleton and Fort Kent have used the chipper and to date, twelve tons of biomass from these chipping operations have been shipped to Northeast Pellets in Ashland. The MFS will then purchase the wood pellets at a reduced rate for use in facilities with pellet boilers, including the Masardis District Forest Office.

The MFS contracts for services that will enable them to identify biomass markets harvested through Wildland Urban Interface for fire protection and identify MFS facilities that are viable candidates for wood-to-energy heating alternatives.

### **Conversion of DOC Facilities**

The Department is utilizing wood-based heat energy in four facilities. Additional candidate facilities are being identified through a combination of efforts. The Bureau of General Services will issue a second RFP for wood-based heat energy systems installation and maintenance in state facilities including one DOC/MFS.

### **The Role of Public Lands**

The Department is assessing the role that the Bureau of Parks and Lands managed lands could play in supporting Maine people with heating assistance.

### **Wood-to-Energy Website**

The Department has created a webpage devoted to the topic of wood-to-energy. While the site is a work in progress, it is intended to increase awareness through the dissemination of accurate information and be a resource for public institutions, private citizen and small business owners.

### **Cord Wood and Wood Pellet Costs and Availability Survey**

The department is undertaking a cord wood and wood pellet survey of prices and availability. This survey is to accompany the Maine Office Energy Independence & Security survey of home heating oil. Results will be made available b-weekly from July 21 through the heating season.