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Biomass Utilization and Restoration Network in the Upper Peninsula of Michigan: BURN-UP Phase II

Final Report for Grant Award #MI 08-DG-11420004-098

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Development Council

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Recipient Contact Person: Darcy Rutkowski

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Recipient Match -	<u>\$53,812</u>
Total	\$102,512



PROJECT HISTORY AND BACKGROUND INFORMATION

The Upper Peninsula Resource Conservation & Development (UPRCD) Council recently completed Phase II of a multi-faceted woody biomass utilization project with the help of a diverse coalition of partners. The project was funded by a grant from the Northeastern Area State and Private Forestry Division of the U.S. Forest Service. Forested areas make up the majority of land cover in Michigan's Upper Peninsula (UP), representing approximately 8.5 million acres, or 79% of the total land base. Forest products industries are an important component of the UP economy and key to maintaining healthy forests in the region. Almost half of the manufacturing jobs in the UP are associated with forest products industries, and the related forestry, logging and support service jobs also provide significant employment. Interest in the utilization of woody biomass remains very high in the region.

There are potentially great economic benefits available from the increased utilization of low quality wood for fuel. Diversifying energy sources using biomass feedstock and reducing infrastructure costs will improve rural community resilience and sustainability. The potential exists for woody biomass to become an important, low-cost fuel for public institutions, such as schools, hospitals and others while at the same time improving forest health and condition by reducing fuels and invasive species, and allowing for forest treatments that in the past were not profitable. It is important to ensure the long term health and sustainability of the UP forest resource through proper management. There are ecological risks that must be avoided. Over-harvesting can lead to depletion of soil nutrients or erosion on certain soil types and to degradation of wildlife habitat.

BURN-UP Phase II is a continuation of the activities and accomplishments of Phase I which contained several components which focused on the sustainable development of the woody biomass industry in the Upper Peninsula. Activities and accomplishments of BURN-UP Phase I included:

- Assembling a team of technical experts to advise the project and assist the Michigan DNR Forest Management Advisory Committee to create Woody Biomass Harvesting Guidelines for the State of Michigan
- Providing education and information to schools, hospitals, and other institutions that are interested in converting their heating system to utilize woody biomass as a fuel source
- Providing tours of Upper Peninsula schools that had already adopted wood as a heating fuel
- Providing engineering pre-feasibility assessments to six Upper Peninsula school districts (8 facilities) to help them determine if conversion to, or supplementing with a wood fuel-based boiler system would be a preferable alternative to their existing non-renewable fuel system
- Conducting harvesting demonstration workshops for loggers, land managers, and foresters to increase their knowledge regarding sustainable methods of harvesting woody biomass that would enhance conventional and restoration-oriented timber harvests
- Creating an on-line woody biomass information clearinghouse linked to the UP RC&D Council website

The BURN-UP Phase II project enhanced the accomplishments of Phase I by addressing the following goals and objectives:

- Continue to assist schools, hospitals and other institutions in their efforts to convert to using woody biomass as a heating fuel
 - Meet quarterly with a steering committee that will guide Phase II of the BURN-UP Project
 - Provide 1:1 cost-share funding for more detailed studies and continued educational programming to the schools that have completed engineering assessments under Phase I to convert to boiler systems that will utilize woody biomass as a heating fuel
 - Contact and provide further information to facility managers of the schools in Michigan's Upper Peninsula that were identified as the top ten candidates for conversion to wood-fired heating systems in the WERC-funded report entitled, "*Exploring Woody Biomass Retrofit Opportunities in Michigan Boiler Operations*" (www.michiganwoodenergy.org)
- Bring information and technology to existing and emerging businesses that focus on the use of low value woody biomass
 - Conduct two biomass harvesting demonstration workshops with a focus on industry needs, and including sustainable harvesting guidelines and evaluation of logging equipment configurations for harvesting and transporting woody biomass
- Increase the sustainable use of woody biomass by further developing local markets and forest industry infrastructure
 - Maintain the web-based clearinghouse and networking site: www.upwoodybiomass.org, and expand it to include several mapping components
 - Present five educational workshops to a variety of audiences (conservation districts, schools, etc.) as part of a larger outreach program
 - Identify potential locations for clustering small-scale wood-energy facilities in order to allow the use of larger and more efficient utilization technologies and to help wood suppliers make harvesting equipment investments by increasing and concentrating markets

- Facilitate a biomass harvest equipment roundtable as part of the Annual Great Lakes Logging Congress to be held in Michigan's Upper Peninsula in 2009

By working with a diverse coalition of public and private partners, the UP RC&D Council has been able to capitalize on current and previous efforts to promote economic stability and healthy forests in the Upper Peninsula. Through Project BURN-UP Phase II, the Council has increased the knowledge of UP stakeholders regarding the sustainable utilization of woody biomass.

SUMMARY OF PROJECT GOALS AND ACCOMPLISHMENTS

Goal 1: Continue to assist schools, hospitals and other institutions in their efforts to convert to using woody biomass as a heating fuel

 ***Objective: Meet quarterly with a steering committee that will guide Phase II of the BURN-UP Project.***

The BURN-UP Steering Committee continued to provide essential expertise to the UP RC&D Council and the BURN-UP Project Director regarding the best strategies to accomplish the goals and objectives of this project. Several of the steering committee members continued to assist the Michigan DNR Forest Management Advisory Committee in finalizing the guidelines for sustainable forest management for harvesting woody biomass in the state. The final document, "Michigan Woody Biomass Harvesting Guidance" was released in May 2010 and is available in Appendix A or online at http://www.michigan.gov/dnr/0,1607,7-153-30301_30505_34240---.00.html. This effort was led by steering committee member and DNR state forester, Cara Boucher.

Members of the steering committee were recognized during Phase I of this project when the BURN-UP Project partnership was awarded the Two Chiefs' Partnership Award by the Chief of the USDA Forest Service and the USDA Natural Resources Conservation Service (NRCS).

 ***Objective: Provide 1:1 cost-share funding for more detailed studies and continued educational programming to the schools that have completed engineering assessments under Phase I to convert to boiler systems that will utilize woody biomass as a heating fuel.*** Many of the schools that received pre-feasibility assessments under Phase I of the BURN-UP Project expressed a continuing interest in the potential for using a woody biomass heating system to heat their facilities. The current economic climate, which is clearly worse in Michigan when compared to other areas of the country, appears to be holding them back at this point in time. Financial concerns are one of the biggest barriers preventing schools from seriously considering the conversion of their heating systems to woody biomass systems. In the long-run, utilizing woody biomass to heat these schools would save all of them money, but finding funds to invest in the conversion is holding them back.

The St. Ignace Area School District was the only district receiving engineering assistance in Phase I that decided to go ahead with the second phase engineering assessment. This more-detailed assessment resulted in somewhat higher estimated construction costs, but also higher fuel savings and estimated that the school could expect a payback in roughly 10.5 years when assuming no difference between the rate of inflation of natural gas over wood chips. Currently, Michigan schools have the opportunity to borrow money with zero percent financing costs through a program offered within the American Re-investment and Recovery Act entitled Qualified School Construction Bonds (QSCB). The cost of financing, which typically would be included in the payback calculations to properly determine the return on an investment, is therefore not included within this report. The conversion would also produce an annual demand for 1,741 green tons of wood chips that would benefit a local wood chip supplier. The district made the decision to install a woody biomass heating system provided they could secure the funding, and has already gone to the voters with one millage request which failed by 11 votes. They will be bringing the request to the voters again in the near future. The engineering assessment for the St. Ignace Area School District is in Appendix B of this report.

The remaining Phase II engineering grant funds were utilized to provide engineering pre-feasibility assessments for two additional educational facilities to help them determine if conversion to, or supplementing with a wood fuel-based boiler system would be a preferable alternative to their existing non-renewable fuel system.

The assessments were conducted at the Republic-Michigamme School and the Ford Center in the Village of Alberta. Each pre-feasibility assessment evaluated the capacity of the existing physical plant equipment, and the location of the current physical plant in relation to any possible biomass installation; type and quantity of existing fuels consumed; estimated size of an adequate biomass boiler and solid fuel storage bin; possible location for a biomass boiler and wood storage facility; what impact could reasonably be expected on the existing site, truck maneuverability, and biomass fuel handling and equipment options; what energy cost savings might be realized; and what type of simple payback could be expected. The estimated fuel savings were calculated by taking the actual fossil fuel costs and subtracting the cost of the amount of wood chips that would be needed to provide the same amount of thermal energy. The estimated construction costs were divided by the estimated fuel savings to arrive at the simple payback. The escalation in fuel costs, both fossil fuel and biomass is uncertain. The studies assumed that escalation in biomass fuel costs will remain even, or possibly lag behind fossil fuel costs over the 20-year amortized life of the system. Availability of any fuel source, including biomass, is difficult to predict with any certainty. It can be said with some certainty that fossil fuels through the next 20 years are projected to decline while renewable biomass fuels, when managed properly, can be a stable source of fuel for many years within the Upper Peninsula. The studies found that all facilities would see fuel savings by utilizing woody biomass. When these fuel savings were compared to the cost of installing the new system, the studies showed that some of the schools could pay back their investment in a relatively short time period. The results of the two new pre-feasibility assessments (Republic-Michigamme and Ford Center) are summarized below, along with the results for each of the six districts (8 facilities) that were evaluated in Phase I of the BURN-UP Project.

School	Estimated Installation Costs	Estimated Annual Fuel Savings	Estimated Payback (years)
Manistique	\$430,000	\$56,593	7.60
Munising Mather	290,000	26,337	11.01
Munising High	428,000	30,432	14.06
Stanton Township	322,000	19,123	16.84
St. Ignace	580,000	73,502	7.89
Tahquamenon	475,000	37,359	12.71
Marquette High	854,000	54,277	15.70
Marquette Bothwell	954,000	24,540	38.90
Republic-Michigamme	535,000	61,708	8.70
Ford Center/Village of Alberta	1,146,300	29,484	38.90

The values in the table above for estimated annual fuel savings are calculated based on the *average price per gallon* of fuel over the two years preceding the study. The engineering firm also calculated the fuel savings based on the *highest price paid per gallon* during the two years preceding the study for both the Republic-Michigamme School and the Ford Center. Using the highest price for fuel causes the estimated payback to decrease significantly.

School	Estimated Installation Costs	Estimated Annual Fuel Savings	Estimated Payback (years)
Republic-Michigamme	535,000	115,497	4.60
Ford Center/Village of Alberta	1,146,300	55,891	20.50

The Republic-Michigamme School is located in a rural area (as are many Upper Peninsula schools) and houses grades K-12. The school's rural setting, with no physical restraints and abundant woody biomass within close proximity, makes it a perfect candidate to explore the feasibility of converting to a woody biomass system. The school has already been progressive in dealing with the financial constraints that most Michigan schools are seeing. Most schools in the country, and especially Michigan, conduct classes 5 days per week. The Republic-Michigamme School has been conducting classes 4 days per week since the 2004-2005 school year. This has been an effort to reduce costs and save money. Even though students only attend class Tuesday through Friday, the amount of time spent in the classroom for the entire year is the same as schools attending five days per week. The length of their day was increased to make up for the lost day in school. They have saved approximately \$100,000 a year, or over a half a million dollars over the last five years. The Republic-Michigamme school board is very interested in the

possibility of a new biomass system which might be paid back in 5-10 years, and is currently continuing discussions regarding conversion and possible funding mechanisms. The engineering pre-feasibility study is attached in Appendix C.

The second pre-feasibility study (see Appendix D) was completed at the Ford Center which is owned and managed by the Michigan Technological University School of Forest Resources and Environmental Science. The Ford Center occupies 5500 acres and includes a conference center, research forest, the Village of Alberta, and the historic sawmill which is now a museum. Alberta was originally founded in 1936 after Henry Ford decided the area would be an ideal spot for a model sawmill community to produce wood that would be used in the manufacture of his automobiles. The mill now houses the Alberta Village Museum. In 1954, Ford Motor Company donated the town of Alberta and 1700 acres of land to Michigan Technological University (MTU). The facility is used to support research and teaching programs for forestry and ecology majors from MTU and numerous other universities from around the United States, as well as a conference facility for educational/technical training, business workshops, meetings, and reunions. The Center can lodge up to 110 participants in a variety of settings and research has been ongoing there since 1954. There are currently 27 structures on the site which are heated. The engineering pre-feasibility study determined the estimated payback on investment in a new woody biomass heating system for the entire Ford Center to be 38.9 years using average energy costs, which is greater than the 25-year life expectancy of the boiler equipment and about equal to the 40-year minimum life of the distribution system. However, using the highest price paid per gallon during the previous two years, the estimated payback would occur in 20.5 years which is more attractive. Due to the wide-spread nature of the buildings at the facility, more than one-third of the estimated construction costs can be attributed to the underground distribution piping. If the Ford Center chose to construct a woody biomass heating system for a subset of the buildings, the payback might be shorter. Michigan Technological University is in the process of having one of their student Enterprise Teams examine all the structures at the Ford Center and make recommendations for energy efficiency maximization for each building. They plan to utilize the woody biomass engineering pre-feasibility study and the information regarding energy efficiency to apply for a grant in the near future which is specifically targeted to upgrading biological stations. If MTU were to incorporate a woody biomass system at The Ford Center, it would provide an ideal site for educating both university students and the general public that visits the museum and conference center (about 10,000 participant nights a year) about the advantages of woody biomass heating systems.



Aerial view of the Ford Center (left); forestry students involved in field courses at the Center (above).

Objective: Contact and provide further information to the facility managers of the schools in Michigan's Upper Peninsula that were identified as the top ten candidates for conversion to wood-fired heating systems in the WERC-funded report entitled, "Exploring Woody Biomass Retrofit Opportunities in Michigan Boiler Operations" (www.michiganwoodenergy.org). There are actually a dozen schools which were identified in this

study as having an estimated payback of less than 20 years if they were to convert their heating systems to woody biomass fueled systems. Special efforts were made to contact all these candidates about the funding assistance available to help them obtain an engineering pre-feasibility study. Four of the schools were extremely interested and have received the grant-funded pre-feasibility studies. All superintendents of Upper Peninsula Schools also received a follow-up newsletter informing them of the results of the engineering pre-feasibility assessments which were completed at the original eight school facilities. The newsletter is in Appendix E.

The UP RC&D Council continues to look for more grant funding opportunities for all of our partner schools, especially grants that will pay for the implementation and installation of systems that utilize renewable fuels like woody biomass. Funding concerns are one of the biggest barriers that schools face when considering conversion to a renewable fuel heating system. We will continue to maintain contact with the remaining schools that were identified as top candidates. It is our hope that they will take a more serious look at this after having seen the promising results the other schools received regarding conversion to a woody biomass system. Expanded use of woody biomass also means more jobs for the high school graduates of these Upper Peninsula Schools.

Goal 2: Bring information and technology to existing and emerging businesses that focus on the use of low value woody biomass.

Objective: Conduct two biomass harvesting demonstration workshops with a focus on industry needs, and including sustainable harvesting guidelines and evaluation of logging equipment configurations for harvesting and transporting woody biomass. Two biomass harvesting demonstrations were conducted in September 2009. Area loggers, foresters, landowners and others were able to view several different types of equipment at work on two different sites, and also heard from speakers on current issues regarding woody biomass.



Bob Zellar discusses the harvest objectives for the mixed hardwood site with workshop participants.

At the first demonstration, about 30 people viewed a chipping operation on a mixed hardwood site near Manistique, where Zellar Excavating was grinding whole trees for use as hog fuel at the NewPage paper mill in Escanaba. A Bandit grinder, equipped with a blower to more efficiently fill the trailer, was being used to process the trees. The audience was able to view the features of the grinder, as well as a Ponsse double-bunk trailer that can compress woody debris and haul it to a grinder more efficiently. The demonstration was sponsored by The Forestland Group, LLC with assistance provided by the logger, Zellar Harvesting.



One of the pieces of equipment being demonstrated was the Ponsse double-bunk trailer.

The second demonstration was sponsored by The School of Forest Resources & Environmental Sciences at Michigan Technological University, on a jack pine site near the Ford Center in Alberta. The site was being logged by Jim Carey Logging and Excavating. The demonstration featured a thinning operation designed to thin a dense stand of jack pine in order to allow the remaining trees to reach merchantable size. The demonstration addressed the situation where a landowner has been managing the jack pine stand for Kirtland Warbler (endangered species) habitat. One reason the bird is endangered is the extremely limited area in which it nests which is limited to a few counties in Michigan. The birds have very specific habitat needs - nesting strictly in young jack pine forests growing on sandy soil. They utilize



Participants view a thinning operation on a jack pine site owned and managed by Michigan Technological University.



A Ponsse harvester moves through the stand of closely spaced jack pine trees.



Trees remaining after the thinning operation.

trees that are about 5 to 16 feet tall (around 8 to 20 years old). A harvester was being used to thin the stand to about 300 trees per acre, with the removed trees ground for hog fuel. The audience of over 50 people was able to learn about the silvicultural objectives of the harvest as well as viewing the various types of equipment in operation.

Following lunch on both days, presentations included hearing from a representative of John Deere about the equipment available for biomass harvesting, and information from Michigan Technological University regarding research they are doing on biomass feedstock inventory in the Upper Peninsula, and use of biomass harvesting to accomplish silvicultural objectives. A roundtable discussion at the end of each day featured representatives from John Deere, Ponsse North America, Inc., and Bandit Industries, Inc. and allowed attendees to direct questions to equipment manufacturers and operators regarding biomass harvesting. The agenda for the harvest demonstration workshops and photos from the workshops are attached in Appendix F.



Biomass is loaded into the chipper.

Goal 3: Increase the sustainable use of woody biomass by further developing local markets and forest industry infrastructure.

Objective: Maintain the web-based clearinghouse and networking site: www.upwoodybiomass.org, and expand it to include several mapping components. The template for accomplishing all of the above objectives through our website has been developed and we have mapped the existing biomass sources and existing biomass users that we are aware of. The soil suitability guidelines (version 1) developed during BURN-UP Phase I by the previous BURN-UP project director are also available on the website. The finalized version of the Michigan Woody

Biomass Harvesting Guidance, as well as sustainable woody biomass harvesting guidelines from other Great Lakes states is available on the site. The site has generated a lot of interest in woody biomass in the area, and the UP RC&D Council is contacted on a regular basis by folks from across the state and country interested in woody biomass that have found us through the BURN-UP website. The UP RC&D Council plans to continue to maintain and improve the BURN-UP website long after the funding for the project has been completed. We feel it is the best source of information regarding sustainable woody biomass harvesting and utilization in the Upper Peninsula and surrounding area. There is an abundance of information regarding biomass and alternative energy available from various sources and we will make this available to our constituents through our website.

 **Objective: Present five educational workshops to a variety of audiences (conservation districts, schools, etc.) as part of a larger outreach program.** Six educational workshops have been presented to a variety of audiences in the Great Lakes region by the BURN-UP project director and several steering committee members.

- Marilyn Shy, the Upper Peninsula RC&D Coordinator, made a presentation at a workshop called "Future Fuels Teacher Institute" to about 20 high school and middle school teachers from Michigan and Wisconsin. The presentation included a tour and presentation at a school which is currently heating with woody biomass. The teachers were made aware of the study "*Exploring Woody Biomass Retrofit Opportunities in Michigan Boiler Operations*" and provided with a printout of the schools from each of their individual counties that showed the best candidates for wood boiler conversion, and in some cases, their individual schools came up on the list!
- Steering committee member Dr. Christopher Burnett made a presentation on the project to a group of about 40 natural resource professionals made up of employees of the Natural Resources Conservation Service and several conservation districts that work throughout the entire Upper Peninsula.
- Steering committee member Bill Cook, a forester with Michigan State University Extension, made a presentation on the BURN-UP project at the 2008 joint annual conference of the Michigan Association of Conservation Districts and the Soil and Water Conservation Society. The meeting, which was held in the Northern Lower Peninsula of Michigan, is widely attended by resource professionals from across the entire state. An article about Project BURN-UP was published in *Forestry Notes*, a publication of the National Association of Conservation Districts (Appendix G).
- Nearly 100 people attended a workshop which was organized by BURN-UP steering committee member Maria Janowiak from the Northern Institute of Applied Carbon Science. The workshop entitled "Forest-based Bioenergy for Michigan's Upper Peninsula" was aimed at foresters, natural resource professionals, logging contractors, local government officials, non-profit conservation organizations, agency representatives, and people making their living in the wood products business. The goal of the workshop was to explore the future of woody biomass utilization in the region and what that might mean for local forests, economies, and communities. Topics addressed by speakers at the workshop included: Energy, Woody Biomass & Other Abstract Ideas (Bill Cook, Michigan State University Extension), Centers of Energy Excellence Update and the Feedstock Supply Chain (Donna LaCourt, Michigan Economic Development Corporation), Woody Energy Crop Production Systems: Adding Another Log to the Fire (Ray Miller, Michigan Tree Improvement Center, Michigan State University), Forest Biomass: Inventory, Potential, and Realized Feedstock Availability (Robert Froese, Michigan Technological University), Forest Residues as a Source of Woody Biomass: Issues & Opportunities (Charlie Becker, Plum Creek Timberlands), Policies, Perceptions, and Wood-based Bioenergy (Kathy Halvorsen, MTU), and Biomass Harvesting Guidance for Michigan (Cara Boucher, MDNR). The conference was covered by the local media and the conference brochure and newspaper article are included in Appendix H.
- Project BURN-UP also got some great exposure at the 5th Annual Sustainable Forestry Conference which is targeted to the same type of audience as the previous workshop. The Conference is held in northern Wisconsin for the residents in the northern portion of that state and the Upper Peninsula of Michigan. Steering Committee member Bill Cook from Michigan State University (MSU) Extension, spoke to a crowd of over 130 participants on "Energy, Woody Biomass and Other Abstract Ideas", and also "Heating

Schools with Wood”. His presentation there also generated a story in the local media which is included in Appendix I, along with the conference brochure.

- BURN-UP Project Director Linda Howlett, along with steering committee members Bill Cook, and the engineer from the firm that performed the pre-feasibility assessments for the schools attended a workshop in Newberry, Michigan entitled “Maximizing Biomass Opportunities in the Eastern Upper Peninsula”. Information regarding Project BURN-UP and biomass energy was shared with approximately 30 participants from throughout the Upper Peninsula. Steering committee member Dean Reid attended the Renewable Energy workshop the following day and made information available to attendees.

 ***Objective: Identify potential locations for clustering small-scale wood-energy facilities in order to allow the use of larger and more efficient utilization technologies and to help wood suppliers make harvesting equipment investments by increasing and concentrating markets.***

Several potential locations for clustering small-scale wood-energy facilities that could be served by district heating or Combined Heat and Power (CHP) plants were identified during Phase II. The BURN-UP Project Director and Steering Committee members contacted potential partners and worked with other steering committee members and the U.S. Forest Service to determine potential suitability for further study of biomass facilities in these areas. The potential clusters are as follows:

- Manistique: The initial phase of Project BURN-UP included a preliminary feasibility study for the Manistique High School, and determined that conversion to a biomass-fueled boiler would be feasible. However, the school felt unable to pursue this option at this time. Discussion of the concept in the community sparked interest among other local units, and with the assistance of Dave Andersen, MSU Extension, Schoolcraft County (and BURN-UP Steering Committee member), several meetings were held to investigate the possibility of either district heating or CHP in Manistique. Partners in the cluster include Manistique Area Schools, City of Manistique, Schoolcraft County, Schoolcraft Memorial Hospital and Medical Care Facility, Schoolcraft County Road Commission, Manistique Housing Commission, and two churches. Manistique Papers, a manufacturer of recycled paper, is also a potential partner if a CHP plant were to be implemented. The U.S. Forest Service – State and Private Forestry, together with Project BURN-UP, funded a preliminary feasibility study for this cluster; the study was completed in November, 2009 and is available in Appendix J. The study revealed that a new woody biomass heating facility serving this cluster of users is feasible. The estimated amount of time to payback the investment in the new facility ranged from 17 to 28 years, depending on the location of the facility. This cluster group is still actively pursuing additional information regarding the feasibility of a woody biomass heating plant in the City of Manistique. Next steps involve securing funding for a full-blown engineering study of all facilities that would include energy conservation plans for all buildings and also identifying the stakeholders who are potential owners for the project and determining their comfort level regarding owning and operating a district heating system. These stakeholders submitted a grant proposal for an Energy Efficiency Conservation Block Grant to the State of Michigan in 2009 which was not funded, but have recently been invited by the Michigan Department of Energy Labor and Economic Growth (DELEG) to re-submit the proposal now that additional grant funds have become available. They remain optimistic about the potential that a district woody biomass heating plant may someday be a reality in their community.
- Escanaba: Bay de Noc Community College encompasses a campus containing several buildings, which in itself could be characterized as a cluster. Each building is served by separate heating systems, and there has been interest in developing a district heating system that would serve multiple buildings. The college was also interested in the educational aspects of developing a state-of-the-art woody biomass facility on campus. Other potential partners located in close proximity to campus include a state-operated juvenile detention center, a county service center, and several industries. The U.S. Forest Service also provided a preliminary feasibility study for this cluster. The study found the initial capital cost for a new biomass heating system serving 11 of the 14 buildings in the cluster to be about \$2.85 million and determined that if the college could obtain a grant on the order of \$900,000, the project would be attractive with a projected positive cash flow starting in the 7th year of the system’s operation. Since this evaluation was not done in

conjunction with a site visit, the cost estimates were developed to a conceptual level only. At this time, new college administrators have opted to take more time to investigate all forms of alternative energy for the campus rather than focusing strictly on woody biomass. They have indicated their interest in biomass may pick up again after a thorough investigation has taken place. The preliminary engineering assessment for the Bay de Noc Community College campus is available in Appendix K.

- Ford Center and Village of Alberta: This site, owned by Michigan Technological University, with 27 heated structures within relatively close proximity, has the potential for a woody biomass heating system at some time in the future. It is not financially attractive using the current cost of fossil fuels (see page 5 of this report for more details). If the university decides to make a woody biomass heating system part of the overall energy efficiency upgrades they implement at this facility, it would provide an excellent opportunity to educate university students and the general public about the benefits of woody biomass as a sustainable energy source.
- Wakefield: A wood chip heating system is in place in the Wakefield School, but is not being used at the current time. Community members were interested in possibly extending the wood-fired system to a community center across the street and a nearby apartment complex; however, facility owners have not yet come on board with the concept. There appears to be potential for a small cluster in this area, if the stakeholders decide to pursue a feasibility study in the future.
- Newberry: A preliminary feasibility study for the Tahquamenon Area Schools was completed during Phase I of Project BURN-UP. While the study indicated that a woody biomass heating system would be feasible for the school, lack of funding prevents the school from pursuing implementation at this time. There is significant interest in woody biomass in the community, and potential partners include Luce County and Helen Newberry Joy Hospital. However, no local commitment of resources or time was forthcoming, and there was no local consensus to pursue additional feasibility studies. This area remains a possibility for a future cluster, however.

 **Objective: Facilitate a biomass harvest equipment roundtable as part of the Annual Great Lakes Logging Congress to be held in Michigan's Upper Peninsula in 2009.** A logger's roundtable took place in April 2009 as part of the Michigan/Wisconsin Loggers' Conference sponsored by the Michigan Forest Products Council. Steering committee member and logger, Warren Suchovsky, made a presentation regarding woody biomass utilization in the UP, and Project Director, Linda Howlett spoke on the BURN-UP Project and promoted the project website and the upcoming woody biomass harvesting demonstrations where equipment would be demonstrated. The topic proposed to loggers and discussed by the group was "What are your barriers to harvesting woody biomass"? Approximately 80 people attended the discussion.

THE FUTURE OF PROJECT BURN-UP:

Phase II of Project BURN-UP has demonstrated that a great potential exists in the Upper Peninsula of Michigan for woody biomass to become an important, sustainable, less expensive fuel for public institutions, such as schools, hospitals and others, while at the same time improving forest health and condition by reducing hazardous fuels and invasive species, and allowing for forest treatments that in the past were not profitable. The BURN-UP steering committee is convinced that one of the most important things that can be done to increase the sustainable use of woody biomass for energy is to continue to work on expanding markets in our area. Several of the institutions or clusters of institutions that were the recipients of engineering assistance and education from the BURN-UP Project, are continuing to pursue the installation of woody biomass heating systems. They are motivated by the savings they would realize by converting to a woody biomass system however, they are primarily being held back by the financial constraints of installing the new system. The UP RC&D Council is actively seeking assistance for these partners to help them pay for implementation costs.