Proposed Biomass Boiler Project Open Forum
University Of Montana - Missoula
December 8, 2010
Community Questions/Comments and Responses – Grouped by Type

1 – Students/Public Communication and Input

1. Students want input into the decision making process.
   - The University welcomes student input for this project. UM is open to discussion and input via public comments sessions and other venues. UM will be meeting with members of the UM Climate Action Now student group.

2. Can we see the details of the current study?
   - The feasibility study and other proposed Biomass project information including this document are at www.umt.edu/biomassplant.

3. What will public involvement process look like?
   - The University will host a number of public forums and poster sessions to update and exchange information about the proposed project development and receive comments. By following the public input requirements of the Montana Environmental Policy Act - MEPA, there is opportunity for public input during scoping, periodic updates to the public during the permitting process for the project, and an opportunity for public review and comment on draft air quality permits and a MEPA environmental assessment (EA) for the project.

4. A) Community members want input prior to BOR decision. B) How can I support the boiler being installed? C) How and when can we give input?
   - You can provide input in writing or by attending a public forum. Letters can be addressed to the folks below. The Board of Regents schedule to listen to public comments at every meeting.

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Note: Responses were developed by a team of people including folks from Bison Engineering, MT Department of Natural Resources, McKinstry, Nextrerra, US Forest Service, UM Administration and Finance, UM Bureau of Business and Economic Research, UM College of Forestry and Conservation, UM Environmental Health and UM Facilities Services. The Project Manager and editor, Tom Javins, is the contact for any errors in the responses.
5. Students will request the President and BOR put this decision off until March when they can attend the meeting.
   - The request for approval to proceed will be at the May 19, 2011 Montana Board of Regents meeting.

6. Students need to be involved. Why haven’t they been to this point?
   - Students were involved in the climate action plan that identified the heating plant as a major source of CO2 emissions and biomass as a potential replacement fuel source. Students have commented on the feasibility study and help outline priorities for the project. There will be opportunity for additional student involvement as the project progresses.

7. Is this a done deal and public comment an afterthought?
   - We started receiving public comments on December 8, 2010. The request for approval to proceed will be at the May 19th Montana Board of Regents meeting, that is a 160 day comment period. There will be structured comment periods in the MEPA process and the Air Quality Permit and the Title V permit processes. In addition, the University is meeting with students, faculty and staff for input into the project development.

   **2 – Neighborhood**

1. Local AQ questions: truck traffic, local impacts, affection of health, odors?
   - Truck traffic will follow existing routes currently being used on campus. Using the main entrance on Eddy/5th and Arthur and traveling along Campus Drive. Fuel deliveries are expected to be 2-3 truckloads/day. These issues will be addressed in more detail in the air quality permit application and the MEPA EA.

2. Ash characteristics and plans for reuse or disposal?
   - Wood ash is mostly calcium and potassium with about eleven other trace elements. For details see: [http://www.fpl.fs.fed.us/documnts/pdf1993/misra93a.pdf](http://www.fpl.fs.fed.us/documnts/pdf1993/misra93a.pdf)
   - There are opportunities to use ash as a soil amendment or it can be disposed of in the landfill.

3. What is the truck route onto the campus? Will it use the new campus entrance?
   - Truck traffic will follow existing routes currently being used on campus. Using the main entrance on Eddy/5th and Arthur and traveling along Campus Drive.

4. Why weren’t the surrounding neighborhoods informed prior to an at large forum?
   - The open forum was an effective way to provide the early development information to a large number of groups. The University plans to visit with neighborhood groups soon.
3 – Climate Action Plan/Greenhouse Gas/Sustainability

1. Watershed management – clear-cuts impacted watershed and plant ecology. What is too much removal of slash?
   - Abundant volumes of biomass material have been identified that will not necessitate clearcutting. UM will be burning biomass materials generated from timber harvests, forest restoration, and hazardous fuels mitigation projects on Lubrecht Experimental Forest, state, federal, and private lands. These projects will generate slash material (tree tops, limbs, branches) that is typically burned on site, as well as low-valued small diameter trees removed to reduce fire hazard and enhance forest health and resilience. The disposal or removal of slash from timber harvesting is required by Montana law in order to reduce fire hazard ([http://dnrc.mt.gov/forestry/Assistance/Practices/fpractices.asp](http://dnrc.mt.gov/forestry/Assistance/Practices/fpractices.asp)). There are comprehensive rules, regulations and guidelines for state ([http://dnrc.mt.gov/trust/FMB/rules/final_rules.asp](http://dnrc.mt.gov/trust/FMB/rules/final_rules.asp)), federal ([http://www.fs.fed.us/emc/nepa/](http://www.fs.fed.us/emc/nepa/)), and private ([http://dnrc.mt.gov/forestry/Assistance/Practices/fpractices.asp](http://dnrc.mt.gov/forestry/Assistance/Practices/fpractices.asp)) forest land owners in place that specify measures designed to minimize impacts to forest resources of concern including water and air quality, biodiversity, wildlife, soils, and noxious weeds. The amount of slash suggested to remain on a particular forested site for the retention of organic material, nutrients and soil protection depends on the forest prescription and forest type. Additional information: Managing Organic Debris for Forest Health: Reconciling fire hazard, bark beetles, wildlife, and forest nutrition needs: [http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0609.pdf](http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0609.pdf).

2. Will steam be produced from wood combustion and how does that relate to fog days in the valley?
   - On cold days, a plume containing water vapor will be visible from the biomass boiler stack – similar to plumes noticeable from the existing natural gas boilers now on those same cold days. There is not expected to be a net increase in water vapor released compared to the existing boiler facility, so no changes in the local area are anticipated.

3. Will CO2 increase locally?
   - The biomass boiler will emit CO2. However the CO2 released from the combustion from biomass will not create a net gain of CO2 in the atmosphere. The combustion of wood is considered “carbon neutral” because as trees grow, they pull carbon out of the atmosphere and when they die, decompose, or are burned they release that same amount of carbon ([http://www.epa.gov/cleanenergy/energy-and-you/affect/air-](http://www.epa.gov/cleanenergy/energy-and-you/affect/air-)).

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emissions.html). With this, there is no net gain of CO2 in the atmosphere and growing plants and trees will continue to cycle that CO2 as long as harvests are done sustainably. Some forest treatments can increase a forests capacity to sequester carbon. The combustion and carbon cycling of forest biomass occurs in a relatively short-time frame as an active component of the global carbon cycle. Compare this to the combustion of fossil fuels like petroleum and natural gas, which release age-old carbon that has been deep in the earth for millions of years, creating a carbon imbalance in the atmosphere which contributes to the greenhouse effect and global climate change. By replacing natural gas combustion with wood biomass combustion, you are displacing the release of fossil carbon, thus achieving a net reduction of CO2. http://www.biomasscenter.org/index.php/resources/fact-sheets/biomass-co2.html. Any local increase of CO2 will be of short duration and below the level detrimental to health at ground level.

4. Some CHP have been shown (www.manomet.org) to release double CO2 than Natural Gas. How does UM’s stack up?

- On a per-unit of energy basis, combustion of biomass releases more carbon dioxide than combustion of natural gas; however, the picture is much more complex than this simple comparison. Production of natural gas results in releases and loss of methane, a more potent greenhouse gas (GHG) than CO2 (EPA is just starting their work to inventory GHG emissions from the oil and natural gas production industry).
  See Answer to #3 in this section.

The UM plans to use biomass material that would otherwise be burned in open slash piles. The goal of slash pile burning is to reduce (as required by MT state law) the fire hazard associated with forest management residues. Thus, the goal of pile burning is essentially complete combustion of hazardous woody fuels. If, instead, you take that material and burn it in a boiler (same CO2 release, same timeframe), you avoid the CO2 release associated with natural gas burning, thus achieving a net reduction. Also see the following research publication which analyzed comparative emissions and energy returns from using forest residues for energy compared with open pile burning: http://www.fs.fed.us/rm/pubs_other/rmrs_2010_jones_g001.pdf.

5. Certification (green) of biomass providers.

- There is no current certification system in Montana specific for biomass providers. Biomass providers to UM will be contractually obligated to follow all applicable laws related to timber harvesting and forest practices. There are comprehensive rules, regulations and guidelines for state (http://dnrc.mt.gov/trust/FMB/rules/final_rules.asp), federal (http://www.fs.fed.us/emc/nepa/), and private (http://dnrc.mt.gov/forestry/Assistance/Practices/fpractices.asp) forest land owners in
place that specify measures designed to minimize impacts to forest resources of concern including water and air quality, biodiversity, wildlife, soils, and noxious weeds.

   • See Answer to #5 is this section.

7. Is it really green as far as sequestering - thin a forest and burn produces CO now. How long until it’s re-sequestered?
   • Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon. Improving forest health through thinning is one of the ways to increase forest carbon in the long run. More information: http://www.fs.fed.us/ecosystemservices/carbon.shtml.

Replacing natural gas with woody biomass keeps fossil CO2 sequestered. The CO2 from woody biomass is going to be released either through burning in piles or decomposition in the forest anyway. Using it for energy replaces natural gas, thus reducing fossil CO2 in the atmosphere.

8. Analyze CO2 emitted from biomass plant (per ton) vs. CO2 emitted for some amount of wood burned in wild land fire.
   • Assuming complete combustion and the same moisture content for wood, the CO2 emissions would be the same. In the current scenario, CO2 is produced by combusting natural gas to heat the campus, and by wood consumed in a wild land or slash fire, or by more gradual decomposition of the wood in the forest. In the future scenario, a significant portion of the natural gas use to heat the campus is replaced by biomass energy, thus leaving the carbon from the natural gas in the ground. This future scenario, when looking at a bigger region, including the Missoula Valley and Western Montana, reduces carbon dioxide emissions to the atmosphere.
   • More on comparative emission rates for wood boilers, wildfire, prescribed burning and slash pile burning: http://www.fuelsforschools.info/pdf/AirQualityInfo_FFS.pdf.

9. What carbon reduction would be achieved by spending $16M on energy conservation; retro-commissioning, and energy efficiency? B) How else could Regents spend money to save heating costs and reduce carbon use – insulation, updated dorms – around the state? C) Would the $16 million price tag of this new biomass plant be better spent on building upgrades and remodels that support energy conservation? Seems that during the winter months many UM buildings must open their windows to cool down, so are the best energy conservation steps already in place?
   • The proposed biomass system is one piece of the University’s commitment to reduce our carbon footprint. There is a concurrent set of energy conservation projects in the planning or construction phase, the carbon reduction from this work will vary for each project and has not been calculated.

4 – Biomass Sources and Forestry Practices

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1. What is the impact of slash removal on plant communities and land – watershed and soil management?
   - The impact of slash removal is highly dependent on the type of harvesting operation and the equipment utilized in the falling, trimming, and yarding of material. Most modern timber operators utilize best management practices to reduce the physical impacts of slash removal. In terms of nutrient balance, on sites with a strong reserve of nutrient capital in the soil (for example, a moist, relatively level, mid-slope site), slash removal would not create nutrient or productivity limitations. On harsher, more nutrient limited sites, continuous removal of organic material, either entire trees or slash, can reduce potential productivity. Additional information: Managing Organic Debris for Forest Health: Reconciling fire hazard, bark beetles, wildlife, and forest nutrition needs: http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0609.pdf.
   - The disposal or removal of slash from forest sites is required by Montana law in order to reduce fire hazard from over-accumulations of forest residue remaining after timber harvesting. In conducting slash disposal, landowners and foresters are encouraged to retain appropriate amounts of woody debris on site to provide ecological benefits in balance with meeting fire hazard reduction requirements.
   - See Answer #1, Section 3.

2. Sustainability of forests – biomass use for burning instead of soil building (many rotations of forest management need good soil).
   - Biomass in forests occurs both above and below the ground level. Below-ground biomass within tree roots, other plant roots, and soil organisms stores between a third and half of total site biomass. Trees recycle nutrients above and below ground, with fine root production and death continuously enriching the soil. Above ground, trees recycle nutrients through their living processes, litter fall, and downed woody material. Most biomass yields from forests are part of larger timber sale operations, since the tree stem is sold for a much higher value as solid wood. The material allocated for biomass removal can be unmerchantable small trees or the tops, branches, or “defective,” less desirable woody material from cut trees. Unmerchantable trees are commonly designated for cutting to reduce fire risk, to improve growing conditions for a future stand of trees, or to encourage growth on the remaining trees on site, as in most “thinning” operations. The amount of above ground biomass represented by the tops, branches, and defective material represents only a proportion of available above ground biomass, ranging from 5-25%, depending on forest conditions. In traditional timber sale operations, an appropriate proportion of biomass is retained and scattered across the forest site for ecological benefits, while the remaining unmerchantable trees or tops and...
branches are typically piled by roadsides and later burned to reduce fire risk. One of the benefits of using this logging “residue” for energy is that the material will burn regardless, but if it burns in slash piles, it will burn at a far lower temperature, create more particulates in the air, and not be applied for human needs, like heating buildings.

3. Need to document how addressed the slash removal nutrients
   - The nutrients within woody material left behind after a logging operation or a disturbance like a windstorm will eventually break down through natural decomposition processes fueled by the activity of bacteria, fungi, and other decomposing organisms. These nutrients will re-enter the soil and either be mobilized to nourish different plants and animals, be stored within the soil profile, or leach through the soil in a water solution and carried off-site below ground.

4. Beetle-killed tree removal results in clear-cut like land.
   - The type of forest treatment implemented to mitigate the risk and spread of mountain pine beetle infestation and damage depends on the extent of infestation. This may include selective tree harvest, thinning, or clear cutting—dependant on the extent of infestation and landowner preferences. More here: http://beetles.mt.gov/Treating/Disposal.asp.

5. Piling slash a bad practice – should scatter
   - Many logging operations use a “cut-to-length” system with modern equipment that only removes the merchantable log portion of the tree and leaves the rest very close to the location of the tree stump. There are advantages and disadvantages to this, as this operation leaves a great deal of available fine fuel on the ground that can present a high risk to wildfire, although it can also be treated further through crushing so that its closeness to the soil allows it to decompose faster. This system reduces the costs of piling and burning slash and leaves organic residue fairly well-distributed on the site. However, it is hard to overstate the importance of fire to these natural systems. Western forests have evolved with fire and can typically recover from them quite well. Yet under certain conditions, fires can burn very hot if fuels on the ground are extremely dry, and these very hot fires can consume the majority of organic nutrients above ground. Additionally, most people don’t want to be threatened by the risk of fire and the smoke from fires creates very negative responses among people. Finally, there is the added complexity of slash pile burning encouraging the spread of invasive weeds, as the burned, bare spots left behind from slash pile fires create conditions where weed seeds germinate well.

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• See Answer to #1, this section.

6. How much should be left?
• How much should be left depends largely on the specific site where timber harvests occur. There is great variability on forest sites: some have never been logged; other sites have been carefully managed; some sites have a recent fire history; some sites are exposed to harsh conditions because of elevation or “aspect,” the cardinal direction of the face of the slope. Where nutrients are limited and soils are poor, it would be prudent to leave more woody material on the site for the eventual recycling of these nutrients into the soil profile.
• See Answer to #1, this section.

7. The forest floor needs “slash” for water retention/shade.
• The forest floor benefits from “downed woody material,” as it provides habitat, shade to microclimates, and greater potential to retain water. Depending on the prior activity or fire history in a given forest stand, there can be a great deal of variability of downed woody material. Sometimes, in heavily stocked stands, there is so much down material that it becomes “jack-strawed” into massive jumbles of logs and branches suspended over the ground, making deposition progress slowly. Large amounts of slash on the forest floor can create a fire risk.
• See Answer to #1, this section.

8. Better solution (questions 5-11) would be a fuel gathering program – leave a researched % of standing and fallen dead wood and woody debris.
• Since the Lubrecht Experimental Forest will be part of the supply chain for the UM boiler, there are several opportunities to run experiments through the Montana Forest and Conservation Experiment Station to understand the consequences of biomass removals. Building off previous research, the ability to design experimental timber sales and varying levels of biomass removal in a variety of forest types will help all Montanans understand how forests in our region respond to these treatments. Harvesting prescriptions that emphasize different types of tree or logging residue removals will give us greater knowledge on how we can sustain the range of important forest values including long-term soil productivity, wildlife habitat, and carbon sequestration.

9. What amounts of industrial methods are required for fuel gathering?
• Forest residues from logging and thinning operations are the targeted sources for fuel supply. The current, well developed logging practices in Western Montana will be used
to harvest and collect the biomass fuel. This may include handfelling with chainsaws, mechanized forwarders, feller bunchers, delimiters, cut-to-length systems, grapples, skidders, and chippers and grinders. By collecting the biomass (residual tree tops, limbs, branches, and small trees) in conjunction with a traditional timber harvest activity, site and soil impacts associated with multiple re-entries are reduced, while also being more efficient and economical.

10. What will happen in the future when more biomass plants come on line? A solution would be to regulation like NFMA (National Forest Management Act).

• There are comprehensive rules, regulations and guidelines in place for state, federal and private forest land owners that specify measures designed to minimize impacts to forest resources of concern including water and air quality, biodiversity, wildlife, soils, and noxious weeds. See Answer to #1, Section 3.

• It’s difficult to say what might be the political responses to a large number of biomass facilities. UM will attempt to provide information that supports policy makers to ensure our forests remain productive, beautiful, and capable of sustained regeneration and a continuing supply of environmental services.

11. How do we make sure slash is always used and not “whole” trees?

• Forest residues from logging and thinning operations are the targeted sources for fuel supply. Depending on the intent of the forest treatment, whole trees of varied size classes and levels of defect may be harvested and collected in order to improve the health of the forest stand. These whole small-diameter and defect trees, with no market value, will end up being piled and burned on site. Whole trees generally have a greater economic value for sawlogs than for energy fuel. But if market value for whole trees is low at time of harvest, those trees may be a source of energy fuel.

• By collecting the biomass fuel (residual tree tops, limbs, branches, and small/defect trees) in conjunction with a traditional timber harvest activity, site and soil impacts associated with multiple re-entries are reduced, while also being more efficient and economical.

12. Could the biomass plant run on urban wood waste and construction waste? If so, wouldn’t this greatly reduce transportation costs and fossil fuel consumption?

• Yes and yes.

13. Could biomass plant run completely on urban wood waste and construction waste or how much?
These are possible sources so long as they are free of contaminate and comparable in cost to forest residue from logging and thinning operations. The amount will be roughly equal for all wood sources, about 15,600 bone dry tons per year for the proposed system.

14. Would pine beetle be brought in with biomass?
- UM will be receiving deliveries of chipped or ground biomass to the campus, not whole trees. Chipping and grinding trees is a recommended, proven treatment for destroying the ability of pine beetles to live and develop. Because chipping and grinding destroys the structural wood habitat of the beetles, any beetle adults, eggs, larva and pupa in the wood will not survive. More here:

15. Have you looked at pesticides in forest wood?
- Most pesticide in Western Montana is applied to range lands and agricultural areas. It is not anticipated that a measurable amount of pesticides will be brought to the facility on the fuel wood. The combustion process will destroy any residues in the unlikely event they are present.

16. Waste-water treatment plants can be used to grow biomass – Missoula currently practicing land application of treated waste water – that would otherwise be discharged into Clark Fork River – to grow poplars & willows.
- This would be a good idea.

17. Other waste-water facilities in the North West have been growing trees this way since the 90’s – main current argument for these facilities – no market for biomass.
- The wood supply contract will be competitively bid per the State purchasing requirements.

18. Can you provide fuel when you need it – like in a winter storm?
- The wood supply contract will be competitively bid and include delivery requirements.

19. A) What’s in the ash? B) Ash as a soil amendment back into the forest.
- The wood in Western Montana is about 2 to 3% ash which are the minerals left after the organic materials are burned. Wood ash is mostly calcium and potassium with about
eleven other trace elements. For Details see: 

20. Does the efficiency of the combustion process, an integral part of the project, take into account the variable moisture contents of the woody material to be used?
• Yes, the moisture content is limited to between 6% and 50%. This ideal moisture content of wood fuel is between 20% and 35%.

21. A) The supplier agreement should include language that precludes the cutting of trees for the biomass. It should only allow for slash. B) Contract language in fuel contract – harvest practices – no harvestable timber used – exclusion of live trees.
• See Answer to #11, Section 4.
• It is highly unlikely that there is an economic incentive strong enough to remove only downed woody material from a forest site. There are other reasons to cut trees in Montana forests independent of supplying biomass feedstock. There are ecological, economic, and fire-risk reduction purposes behind most timber harvest activity. A biomass energy facility will allow forests management operations to proceed more efficiently, as a durable market will be created for products from the forest that had previously been unmerchantable.
• Biomass providers to UM will be contractually obligated to follow all applicable laws related to timber harvesting and forest practices.

22. Quality and Quantity control of biomass source.
• Quality control will be an important part of biomass utilization.

23. Concern: The scope of the decision making process pertaining the UM Biomass facility does not extend to land management project that may result in fuel for this boiler.
• There are comprehensive rules, regulations and guidelines in place for state, federal, and private forest land owners that specify measures designed to minimize impacts to forest resources of concern including water and air quality, biodiversity, wildlife, soils, and noxious weeds. See Answer to #1, Section 3.
• Within Missoula County, 2.5 to 6 times more waste wood (logging and mill residue) is produced than the proposed UM facility would use each year. This range includes good and poor wood products years from 2004 to 2009.
• An additional 5.6 million dry tons (280-year supply) of small trees are potentially available across more than 690,000 acres of non-reserved, non-old-growth forest in Missoula County. About 1.6 million dry tons are on private lands, and about 3.3 million tons are on national forests.

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5 – Air Quality/Environmental Review

1. In Europe, they use biomass power plants much more than we do – perhaps 3 x as much, but we don’t see that (at least in Western Europe) they have major smog problems. How does the Nexterra’s plant design and controls compare to the modern European products?
   • The Nexterra design is an updraft gasifier with excellent combustion control. In addition the current proposal includes nitrogen oxides and particulate emission controls that compare favorably with the current European systems.

2. If you’ve already built scrubbers into the project budget, you have a responsibility to keep them there.
   • The current budget includes an electrostatic precipitator for particulate control and a selective non-catalytic reduction system for nitrogen oxides control.

3. Since you still produce significant CO2 and NOx, wouldn’t it make sense to use those emissions to produce algal fertilizer and produce a truly net negative CO2 process? - See www.AlgaeAqua.com – a Montana company.
   • We are considering the possibility of this technology within the physical and budget constraints of the proposed project.

4. How will this plant impact county air quality in relations to NAAQS?
   • We will develop this information as we work though the analysis for the Air Quality Permit. It will be provided in some detail in the air permit application and MEPA EA.

5. How does the new boiler air emissions compare to the existing Natural Gas boilers on campus?
   • The goal of the project is to reduce the net CO2 emissions from fossil fuels. Compared to the current emissions for particulates and NOx, the biomass boiler emissions may be slightly higher on an energy output basis. The total emissions and their potential impacts will become better quantified as the design is developed and the Air Quality Permit analysis is completed.

6. MEPA is a required – EIS not EA
- We have been advised that an Environmental Assessment is appropriate for this project to comply with MEPA. An Environmental Impact Statement (EIS) is only required if a significant impact to the environment (that cannot be mitigated) results from the project. Based on the small quantity of air emissions from this project, and the fact that it is replacing existing boiler capacity on campus, it does not appear an EIS is necessary.

7. Where are we in the MEPA/NEPA process?
- The project will comply with the Montana Environmental Policy Act (MEPA). The MEPA process is in the early stages and will begin with a scoping meeting to gather comments from the public for input into the process.

8. I am really concerned about PM 2.5. This boiler should not increase pollution above existing conditions created by current gas boiler – no net gain.
- Our goal is to be as clean as possible and to meet all Air Quality Permit requirements. The dispersion modeling required for permitting will allow a good prediction of the impacts of any changes in PM2.5 from the existing conditions.

9. Research shows that even these "small" combined heat and power (CHP) biomass burners emit more CO2 than fossil fuels. Brand new CHP biomass burners emit about 287 lbs/MMbtu of carbon dioxide, compared with 146 lbs/MMbtu for natural gas. Also, CHP biomass burners emit over 5 times the particulate emissions compared with natural gas. As such, how can UM switching from natural gas to biomass really "reduce emissions" as everyone has been claiming?
- See answers to section 3 GHG on pages 3 & 4. The reduction claimed is for CO2 from fossil fuels. This is accomplished by using carbon (wood) in the fast carbon cycle. All CHP systems are not the same. The proposed plant uses a cleaner burning technology and emissions controls than the system you have referenced for particulate emissions.

10. What will the impact of this plant have on Missoula air over 20 years?
- We will have a better idea of the long term impact of the Air in Missoula with the analysis required for the Air Quality Permit. The Missoula City-County Health Department will be evaluating the specifics of the impact of the proposed system on the Missoula airshed.
- By burning woody biomass in an emission-controlled environment to generate energy, we may see improvements in local air quality as it displaces emissions from biomass burned in open slash piles and/or in potential wildfires.
11. If total annual PM is reduced (including forest fires) there will be a net decrease of PM.
   - Burning slash wood in the proposed boiler will reduce the particulate matter in the air as compared to burning an equivalent amount of wood in slash pile burning or a prescribed burn.

12. Burning on site in woods is away from populations and above inversion longer.
   - Thank you for your comment. The air quality permit will address emissions at the proposed facility.

6 – Health Issues

1. What about the students in Aber Hall? These emissions are too close, and for individuals climbing the “M” trail.
   - As part of preparing an air quality permit application for the proposed biomass boiler, air dispersion modeling will be done to determine in advance of operation the potential impacts of emissions from the proposal. The results of the modeling will help determine what emissions control technology will be installed in order to meet all air quality standards for the immediate area and the Missoula airshed.

2. Emissions to health effects – newest research says no safe level of 1.5 and any increase is linked to increased lung issues, diabetes, heart attack, etc.
   - Assuming this commenter is referring to PM 2.5 (particulate matter 2.5 microns or less in size) the EPA provides the following on their website at:
     http://www.epa.gov/pmdesignations/faq.htm#2
   - Who is most at risk? Roughly one out of every three people in the United States is at a higher risk of experiencing PM2.5 related health effects. One group at high risk is active children because they often spend a lot of time playing outdoors and their bodies are still developing. In addition, oftentimes the elderly population is at risk. People of all ages who are active outdoors are at increased risk because, during physical activity, PM2.5 penetrates deeper into the parts of the lungs that are more vulnerable to injury.
   - The US Environmental Protection Agency (EPA) is charged in the Federal Clean Air Act with setting National Ambient Air Quality Standards (NAAQS) for air pollutants, including fine particulate matter, at levels that protect public health and the environment. EPA has been actively reviewing NAAQS levels over the last several years, and they are currently reviewing the fine particulate standard. In the meantime, we have a NAAQS for fine particulate matter (PM-2.5) that has been established by EPA to protect public...
health with a margin of safety, and the permitting process for the proposed project will be based on protection of the current PM-2.5 NAAQS.

3. Is the UM aware of the growing health concerns about biomass burning and storage? For example, please see handouts (links below) from the American Lung Association and the Massachusetts Medical Society.

- The health concerns noted in the handouts are tied to exposure to air pollutants resulting from a variety of sources, which may include biomass combustion. The air permitting process responds to general concerns about public health protection by specifically evaluating potential air impacts from the proposed project, and by comparing those impacts to established, health based NAAQS. Further information on potential impacts of the proposal on local air quality will be provided as the air permitting process unfolds.

- The below article was distributed at the Biomass Open House at The University of Montana. It is accurate in its assessment of the potential health impacts related to the large scale incineration of wood to directly generate energy. Direct biomass combustion at its best releases large amount of particulates and gases to the atmosphere. Fortunately, this has nothing to do with the proposed biomass gasification boiler at The University of Montana. The proposed gasification boiler will heat wood residue in a closed vessel and only burn the gas byproducts, releasing fewer particulates. Much of the wood used by the biomass gasification plant would otherwise be burned as slash in the woods with no control on the combustion process.

Massachusetts Medical Society Adopts Policy Opposing Biomass Power Plants
December 9, 2009

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Waltham, Mass. -- December 9, 2009 -- On the grounds that biomass power plants pose an unacceptable risk to the public’s health by increasing air pollution, the Massachusetts Medical Society has adopted a policy opposing three currently proposed large-scale biomass power plants in Massachusetts and urging state government to adopt policies to minimize the approval and construction of new biomass plants.

The policy, proposed by the organization’s Committee on Environmental and Occupational Health, was approved by the Society’s House of Delegates at its
interim meeting on December 4. The MMS House of Delegates, comprised of physician members from across the state, sets policy for the 22,000-member statewide physician organization.

Currently, three large-scale plants are being proposed for western Massachusetts, in Russell (Hampden County), Greenfield (Franklin County), and Springfield (Hampden County). The plants propose to burn wood from harvested trees and/or construction debris and will be situated near neighborhoods, schools, and homes.

Jefferson Dickey, M.D., an internist at the Community Health Center of Franklin County in Turners Falls and a former chair of the committee, was one of the authors of the resolution adopted as policy.

Dr. Dickey said “Air pollution is a common and noxious mixture of gasses, particles, liquids, the vast majority of which comes from power plants, industrial furnaces and high-temperature industrial processes, and transportation, such as buses, trucks, cars, and small engines.

“Epidemiologists have long recognized that air pollution is associated with an increased risk of a broad range of medical problems,” Dr. Dickey continued, “from asthma attacks and decreased lung growth in children to increased lung disease exacerbations, emergency room use, hospitalization rates, heart attacks, and death rates in adults.”

“Recent research and medical literature reviews provide graphic confirmation of the seriousness of the issue,” he said. “The equation is simple: the more air pollution, the higher the mortality rate. Research has shown that lowering air pollution levels is associated with better health outcomes.”

Current state policy considers biomass fuel renewable, because trees consumed as fuel are assumed to re-grow, and biomass electricity generation is eligible for financial incentives under the state’s Green Communities Act, which mandates that an increasing proportion of the state’s power be generated from renewable sources.

The policy adopted by the Medical Society’s contained four points:

- Urging state government to adopt policies to minimize the approval and construction of new biomass plants, and instead promote energy efficiency and conservation and zero-pollutant emissions renewable energy technologies;

- Opposing the three currently proposed large-scale biomass power plants in Massachusetts on the grounds that each facility poses an unacceptable public health risk;
- Urging state and federal government through appropriate channels to remove large-scale biomass electricity generation plants from the list of technologies eligible to receive renewable energy credits, federal stimulus funds, and Massachusetts Technology Collaborative loans, and thereby remove these incentives for their existence; and

- Urging state government to extend Department of Environmental Protection regulatory authority to small-scale biomass facilities to ensure that the most protective air pollution emissions controls are utilized.

The Massachusetts Medical Society, with more than 20,000 physicians and student members, is dedicated to educating and advocating for the patients and physicians of Massachusetts. The Society publishes the New England Journal of Medicine, a leading global medical journal and web site, and Journal Watch alerts and newsletters covering 13 specialties. The Society is also a leader in continuing medical education for health care professionals throughout Massachusetts, conducting a variety of medical education programs for physicians and health care professionals. Founded in 1781, MMS is the oldest continuously operating medical society in the country. For more information, visit www.massmed.org, www.nejm.org, or www.jwatch.org.

4. While the UM biomass system may only emit 2.1 tons of particulate matter per year, does that include the dust released on campus during material preparation?
   - That preliminary estimate addressed projected emissions from the biomass boiler. Biomass will be processed off-site, and delivered in covered trucks. We are still assessing the potential for emissions, but anticipate that the unloading of two truckloads of biomass will have minimal emissions.

5. Furthermore, the system will be a point source emitter located right next to campus housing and situation within a crowded residential neighborhood.
   - See response to Comment #1 in this section.


   - The American Lung Association article above is again primarily addressing wood stoves and direct combustion biomass burners, not gasification facilities. An excerpt from this statement that does address biomass used to heat schools states:

   “If wood is used for school heating, it should not be considered until it has been demonstrated that the building envelop is highly efficient, the combustor is of an advanced combustion design, the most advanced emissions control systems are being used, the operators are well trained, and the fuel is procured under a ‘sustainable’ plan.”
UM is committed to adhering to those recommendations.

7. Also in 2009, the Massachusetts Medical Society – publishers of the New England Journal of Medicine, the leading global medical journal – adopted a policy opposing biomass power plants. You can view the Massachusetts Medical Society’s press release here: http://www.massmed.org/AM/Template.cfm?Section=home&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=32796
   • See response to Comment # 3 in this section.

7 – Financial/Facility

1. Is the cost of wood and Natural Gas accurate?
   • We hope so, the projected fuel costs, both natural gas and biomass are critical to the feasibility study and were estimated by several different method. The final prices used were provided by outside consultants based on local surveys and conditions. Our goal is to be reasonably conservative in the projections for future costs.

2. A) Is the cost of the fuel wood real? B) Is the projected price of delivered wood fuel at about $38 per ton really realistic when UM-Western in Dillon already pays $51 per ton and the price of diesel fuel is bound to increase, what type of delivery price escalator factor have you considered? C) Dillon is @ $51/ton; why do we think we can pay $38/ton in the future? D) At what price of delivered natural gas is the predicted $1,000,000 savings predicated upon? The old gas price was about $9.00, the present is $6.90, and future prices will probably be lower. Natural gas prices have gone down 73% since 2005 and 21% since December 2009, yet the UM finance people at the meeting said the fiscal analysis was based on natural gas prices increasing 3% a year. Is this realistic? E) What will the future of natural gas prices do to economics of the project and the price of diesel?
   • See response to Comment #1 in this section.

3. Is the transport possible when needed at the cost?
   • The wood fuel delivery contact will include an adjustment for transportation fuel costs.

4. Does the price of the project and the projected savings factor in the cost of the nitrogen oxide suppression process? Unfortunately the production of NOx concentrations rises exponentially with increasing temperature with ammonia or urea methods reducing emissions between 30% and 70%.
• Selective Non-catalytic Reduction Control (SNCR) has been budgeted in the feasibility study.

5. In regards to the University of South Carolina biomass system, they are far from natural gas sources, probably Texas so how does their delivered gas price compare with the price the UM pays?
   • The prices for natural gas at other than in Missoula Montana do not pertain to the proposed project.

6. Word on the street is that Northwestern Energy wants to not only purchase but invest an additional $70 million on a 40 megawatt biomass plant at the former Smurfit-Stone site. Is UM aware of the tremendous financial impact this would have on the project and the annual procurement cost of wood waste?
   • We cannot control the future or actions of others. The pricing and cost projections were conservative in the feasibility study for that reason.

7. Who will pay for project and/or operations if guaranteed cost savings do not materialize?
   • The savings guarantee is for the amount of natural gas that is offset by wood. The offset amount is 233,280 dekatherms. The Energy Performance Contractor will pay for any shortfall if this amount of gas in not offset annually.

8. How much is allowed and factored in for annual maintenance, repairs, etc.? Seems as if the Nexterra plant in SC has had some problems. What kind of guarantees come from the Nexterra plant?
   • The average operation and maintenance cost, excluding fuel, is $481,000 annually during the 20 year debt service period. The guarantee by State law is one year parts and labor. The fuel savings guarantee is annually for 20 years.

9. Wood fired boilers have a multitude of operational problems. Is it realistic to think you can run this plant smoothly with the proposed staff of 1 extra person?
   • That is our assumption for the feasibility study; we will be evaluating the staffing needs as the design phase progresses.

10. Will the existing emergency generator power the new boiler?
    • This question came from a UM heating plant employee and will be addressed in the design phase of the project.

Note: Responses were developed by a team of people including folks from Bison Engineering, MT Department of Natural Resources, McKinstry, Nexterra, US Forest Service, UM Administration and Finance, UM Bureau of Business and Economic Research, UM College of Forestry and Conservation, UM Environmental Health and UM Facilities Services. The Project Manager and editor, Tom Javins, is the contact for any errors in the responses.
11. A) Why not reduce purchased electricity by adding that capacity to the proposed project? B) Why not install a 1200 psi boiler and generate more electricity? C) Go to a higher pressure output.

- Going to a higher pressure to generate additional electricity was evaluated with the current electric power costs and found to be not as practical as operating at the current steam pressure.

**8 – Economic Development**

1. Will local workers be hired for construction?

- Yes, the local labor force will be involved in the design, fabrication and construction of the project.

**9 – Education & Research**

1. A) Will there be educational aspects to this project? B) How about research, will research be a part of this project?

- There will be both educational and research opportunities when the biomass project becomes operational. Already in existence at the College of Technology is the Energy Technician program. The operations and maintenance of the new state-of-the-art biomass gasification system will be added to the curriculum. To make classroom instruction more efficient a 30 seat classroom has been incorporated into the building that will house the biomass plant. In the area of research, considerable interest has been expressed by the College of Forestry and Conservation to analyze the sustainable harvesting of forest waste products and the related effects this has on forest health and productivity.