

MEETING NOTICE

Governor's Task Force on Global Warming
Ad-hoc Waste Materials Recovery and Disposal Work Group
Friday, February 29, 2008, 12:00 noon to 3:00 p.m.
Room 613, State Natural Resources Building (GEF 2)
101 S. Webster Street, Madison

DRAFT AGENDA

- 1) Welcome and review of agenda
- 2) Status/progress update
- 3) Review of (1) electronics reuse & recycling, (2) food waste, (3) increased paper recycling template revisions
- 4) Review waste wood template revisions
- 5) Review 'improved recycling template'
- 6) Additional templates?
- 7) Next steps?

This meeting is open to the public.

For more information, or if you need special accommodations to attend this meeting, contact Nick Sayen, DNR, at (608) 267-2466 or nick.sayen@wisconsin.gov.

**Wisconsin Global Warming Task Force Industry Workgroup Policy Option:
Reduce GHG emissions through increased electronics reuse and recycling
(revised 2/15/08)**

1. **Workgroup:** Waste
2. **Policy name:** Reduce GHG emissions through increased electronics reuse and recycling
3. **Policy type:** regulation/legislation, incentives
4. **Affected sectors, sub-sectors and/or entities:** computer/electronics producers, retailers and recyclers; businesses and residents; municipalities; landfill operators; waste and recycling haulers
5. **Estimated greenhouse gas emissions reduction impact:** Carbon savings from recycling computers (extracting recyclable materials such as aluminum and glass) and especially from refurbishing computers—reducing the need for new computer equipment—are potentially significant given the growing volume of electronics in use. The exact amount of electronics equipment that could be recycled/refurbished every year is difficult to pinpoint, but a 2006 DNR survey estimated that there are currently 3.8 million computers (about 60,000 tons) and nearly 7.5 million televisions (about 190,000 tons) in Wisconsin households. The estimates do not include the computers and other electronics found in businesses and institutions, though these entities are currently more likely to recycle their electronics due to state hazardous waste rules.

While not all of the household computers and televisions are obsolete, the short life of many electronics indicates that significant volumes are or will be ready for disposal in coming years. There is evidence from the household survey and other sources that households and small businesses are storing a large volume of unusable or unwanted electronic equipment, and that only a small volume of electronics is currently being landfilled.

Virtually all of this equipment can either be recycled or refurbished. Research indicates that, with both household and business sources taken into account, approximately 50 percent of used electronics are recycled and 50 percent refurbished when the equipment is recovered for these purposes. However, all but the smallest businesses, and households, are prevented by hazardous waste laws from disposing of computer equipment in landfills. Therefore, most of the used material that would be diverted from landfilling comes from households and small businesses, and this material tends to be older and less susceptible to refurbishing. According to recycling industry sources, a more accurate estimate for the refurbishing rate of household computers is on the order of 5 percent.

If 20 percent of residential in-service computers and televisions were replaced in Wisconsin every year and of these, 5 percent were refurbished and 95 percent were recycled instead of all landfilled, an order-of-magnitude estimate of greenhouse gas reductions would yield approximately **249,333 MTCO₂E per year**.

6. **Estimated costs:** Costs for landfill operators, waste and recycling haulers, municipalities and businesses could increase if additional equipment or changes to administrative procedures to divert electronics from landfills to recycling centers are needed. Some of these costs could be recovered through the sale of refurbished computers, recyclable components or recycled products. Manufacturers could minimize costs through design improvements to increase the recyclability and reusability of electronic products. DNR costs would increase associated with expanding its landfill inspection and

enforcement program. The state (and some local governments) would lose tipping fee revenue when more materials were recycled instead of landfilled.

7. Specific description of policy proposal: This policy would reduce GHG emissions by diverting electronics for reuse and recycling through a landfill ban and a state program requiring manufacturers to assume responsibility for collecting and recycling certain discarded household electronic products.

The Governor's Task Force on Waste Materials Recovery and Disposal recommended establishing a state policy to promote environmentally sound recycling and reuse of discarded televisions, monitors, laptops and desktop computers. The Task Force endorsed the principles developed by Midwest E-Waste Policy Initiative, which focus on product stewardship by manufacturers in a system that would be adopted by Wisconsin and five other Midwest states to provide regional consistency for manufacturers, recyclers and consumers. The Task Force's recommendation was designed around a shared responsibility model that would not unduly burden local or state governments with the costs of collection and processing.

Since that time, Minnesota has enacted a law consistent with the Midwest initiative, and a Wisconsin state senator has introduced legislation consistent with the Minnesota bill in December 2007. The bill would ban all computer monitors and televisions containing cathode ray tubes (CRTs), computers and other video display devices from Wisconsin landfills, and require electronics manufacturers to recycle a certain amount of electronics per year based on their sales to households in the state.

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This working group recommends the adoption of an electronic waste policy consistent with the Midwest E-Waste Policy Initiative which would establish manufacturer responsibility for the recycling of electronic waste.

8. Timetables, duration and stringency options: Development and passage of legislation would take at least one year. The landfill ban and manufacturer requirements would be phased in to allow all impacted parties time to educate residents and to establish the infrastructure for collection and processing, and allow the DNR to design and implement registration, tracking and inspection programs. Duration would be indefinite.

9. Explanation of rough estimate of GHG reductions:

The GHG reductions in this policy come from:

- providing recycled materials (such as aluminum, glass, lead and copper) from computers for use in new products, thus reducing the need for virgin materials and reducing the energy needed to produce the new products; and/or
- refurbishing and reusing computer equipment, thus extending its life and reducing the need to manufacture new computer equipment.

The U.S. Environmental Protection Agency has calculated that, compared with landfilling, each ton of computers recycled reduces GHG emissions by **0.63 metric tons carbon equivalent (MTCE)**, while reducing the need for new computers would reduce GHG emissions by **15.14 MTCE** per ton of computers refurbished for continued use.¹ (These numbers translate into 2.3 and 55.5 metric ton carbon dioxide equivalents (MTCO₂E), respectively.)

¹ From *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (3rd ed.), U.S. Environmental Protection Agency, <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>

10. Rough estimate of costs for selected years: With household computers, televisions and other electronic equipment (video display devices) being diverted from landfills to recycling and reuse, the state would lose tipping fee revenues. Currently the state receives \$4/ton from a recycling tip fee and \$1.90 from combined environmental fees. The exact amount of lost revenue would depend on the tonnages diverted from landfills each year. Electronics manufacturers would also incur costs associated with collecting and recycling equipment.

11. Barriers to implementation:

- **Logistical:** A comprehensive tracking, inspection and enforcement program would need to be implemented to ensure compliance with program requirements by manufacturers and at landfills.
- **Financial:** Under the producer responsibility model, there should be minimal financial barriers to implementation.
- **Political:** While stakeholders agree that a system is needed to ensure environmentally sound recycling and reuse of discarded electronics, there is disagreement on the approach among the various stakeholders.

Wisconsin Global Warming Task Force Industry Workgroup Policy Option: Reduce GHG emissions through reduced landfilling of food waste

1. **Workgroup:** Industry (cc: to Conservation and Energy Efficiency)
2. **Policy name:** Reduce GHG emissions through reduced landfilling of food waste
3. **Policy type:** incentives
4. **Affected sectors, sub-sectors and/or entities:** municipalities, compost facilities, landfill operators, businesses and institutions
5. **Estimated greenhouse gas emissions reduction impact:** The following tables present a rough estimate of the savings in GHG emissions if 25 percent or 50 percent of food waste currently generated and landfilled in Wisconsin each year were composted instead.

Annual reductions in GHG emissions, in metric ton carbon dioxide equivalents, from food waste diverted from landfills to composting facilities

Material	Tons ¹ Landfilled	Emissions factor ² (MTCE/ton)	Total savings (MTCO ₂ E) if 25% composted	Total savings (MTCO ₂ E) if 50% composted
Food waste	486,619	-0.25	111,518	223,032

6. **Estimated costs:** There would be significant start-up costs for municipalities and others collecting and composting food waste. This would include large-scale education and outreach programs to get businesses (and eventually residents) to properly separate food waste. Some of these costs might be met by state funding or incentives. There would be lost revenue from landfill tipping fees as more waste was diverted to composting facilities.

7. **Specific description of policy proposal:** Food waste makes up more than 10 percent of all municipal solid waste generated and landfilled in Wisconsin each year. Because of the high volume of food and other compostable organics in the waste stream, the Governor’s Task Force on Waste Materials Recovery and Disposal recommended actions to substantially increase the diversion of waste organics, including food residuals, from disposal. A key benefit of this would be to reduce GHG emissions, primarily by reducing the amount of materials in landfills that decompose anaerobically, thus releasing methane.

Currently, there are significant amounts of food in the waste stream, much of it from commercial and institutional sources such as grocery stores, restaurants, institutions, food distributors and food processors. There is, however, little infrastructure or precedence in Wisconsin for large-scale composting of materials other than yard trimmings. Because of these limitations, the Task Force recommendations centered on actions to address knowledge and regulatory barriers rather than policies to legislate mandatory actions or provide incentives for voluntary approaches. Specific recommendations include the following:

¹ From DNR 2002 Waste Characterization Study, <http://dnr.wi.gov/org/aw/wm/recycle/studies/index.html>.

² From *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (3rd ed.), U.S. Environmental Protection Agency, <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>

1. Initiate a study to identify contributors of pre- and post-consumer food waste currently entering the municipal solid waste stream. The initial focus would be on commercial/institutional generators because these sources account for nearly 60 percent of landfilled food waste and include many single, large-volume sources, which would ease collection and reduce administrative costs.
2. Initiate research on the details of public health, practicality and costs of food waste composting from commercial properties, including pilot implementation studies.
3. Develop and promote a hierarchy for the recovery of source-separated food waste, including donations for human use, animal feed, energy recovery and biofuel production.
4. Identify and develop a strategy to reduce barriers to increased diversion of food wastes.

The above recommendations would provide a platform from which specific policy proposals to achieve significant GHG reductions through increased food waste diversion could be developed. Such policy proposals might either mandate some level of diversion or provide incentives for voluntary approaches and local initiatives. The estimated GHG savings noted in Section 5, above, assume the implementation of an effective strategy based on the results of the above recommendations

8. Timetables, duration and stringency options: Funding for research should be made available as soon as possible, ideally by the 2008-2009 fiscal year. Should the Wisconsin Global Warming Task Force elect to recommend additional policy proposals, funding for these should be made available as soon as possible, ideally by the 2009-2010 fiscal year at the latest, with a goal of 25% diversion of food waste by 2012 and 50% by 2015.

9. Explanation of rough estimate of GHG reductions: The GHG reductions in this policy come primarily from reducing landfill methane emissions by diverting wet organic waste (food) that would otherwise break down anaerobically in the landfill. There is also a small GHG benefit from the carbon stored in the compost itself. Since the majority of the benefit comes from the diversion from landfilling, other uses of food waste (such as donation of edible food or use in animal feed) would likely have a similar GHG impact.

The estimates are based on data from the DNR's 2002 Waste Characterization Study, which estimated the amounts of materials generated and landfilled in Wisconsin each year. Estimates of 25 and 50 percent of landfilled food waste were used to represent increased diversion as the composting infrastructure improves. (These estimates are more conservative than for other waste materials due to the current lack of infrastructure and the large number of individual sources of food waste—essentially all homes, businesses and institutions in the state.) These tonnages were multiplied by an emissions factor calculated by the U.S. Environmental Protection Agency. The emissions factor represents the difference, in metric ton carbon dioxide equivalents (MTCO₂E), of composting compared with landfilling a material.

10. Rough estimate of costs for selected years: With food waste diverted from landfills for composting or other reuse, the state would lose tipping fee revenues. Currently, the state receives \$4/ton from a recycling tipping fee and \$1.90/ton from other fees (principally an environmental repair fee) for solid waste disposed of at Wisconsin landfills. The table below shows the lost revenue for the 25 and 50 percent diversion scenarios. Aggregate annual revenue from the fees is approximately \$45 million.

Certain local governments that receive tipping fee revenues under local negotiated agreements would also lose a small proportion of these revenues as tonnages decreased.

There would also be costs from state support of local or business food waste diversion initiatives.

Annual loss in state tipping fee revenue due to diversion of untreated wood from landfills

Additional composting of current tons landfilled	Lost recycling tipping fee revenue	Lost environmental repair and other fee revenue	Total revenue loss
25 percent (121,655 tons)	\$486,619	\$231,145	\$717,764
50 percent (243,310 tons)	\$973,238	\$462,288	\$1,435,526

11. Barriers to implementation: There is currently very little infrastructure in Wisconsin for collecting and composting food waste on a large scale, so significant time and resources would need to be invested in such a system. Local governments would need to have an interest in adding food waste to their collection systems and a commitment to educate residents and businesses. Large sources of food scraps (such as food processing plants) might need incentives or assistance to manage their high volumes of waste and offset costs associated with setting up a composting program.

Wisconsin Global Warming Task Force Industry Workgroup

Policy Option: Reduce GHG emissions through increased paper recycling

1. **Workgroup:** Industry (cc: to Conservation and Energy Efficiency)
2. **Policy name:** Reduce GHG emissions through increased paper recycling
3. **Policy type:** regulation/legislation, incentives
4. **Affected sectors, sub-sectors and/or entities:** landfill operators, waste and recycling haulers, municipalities, residents, businesses, paper industry

5. **Estimated greenhouse gas emissions reduction impact:** The following table presents a rough estimate of the savings in GHG emissions if 50 percent or 75 percent of recyclable paper generated in Wisconsin and currently going to Wisconsin landfills were recycled instead. The calculations are based on a 2002 DNR study and U.S. EPA life-cycle analysis of waste management alternatives.

Annual reductions in GHG emissions from paper diverted from landfills to recycling

Material	Tons ¹ Landfilled	Emissions factor ² (MTCE/ton)	Total savings (MTCO ₂ E) if 50% recycled	Total savings (MTCO ₂ E) if 75% recycled
Mixed recyclable paper	201,715	-1.03	380,908	571,355
Recyclable cardboard	188,176	-0.96	331,225	496,786
Newspaper	92,270	-0.52	87,963	131,949
High-grade paper (office paper)	65,585	-1.31	157,516	236,273
Magazines	47,381	-0.76	66,018	99,026
TOTALS	595,127		1,023,630	1,535,389

6. **Estimated costs:** Costs for landfill operators, waste and recycling haulers, municipalities and businesses could increase if additional equipment or changes to administrative procedures to divert paper from landfills to recycling centers are needed. Some of these costs could be recovered through the sale of recyclable paper. DNR costs would increase associated with expanding its inspection and enforcement program. The state (and some local governments) would lose tipping fee revenue when more materials were recycled instead of landfilled.

7. **Specific description of policy proposal:** This policy would reduce GHG emissions by diverting more recyclable paper from Wisconsin landfills through a graduated expansion of existing landfill paper bans in conjunction with increased outreach, enforcement and incentives.

Unrecovered paper represents 20.8% by weight of the in-state municipal solid waste stream in Wisconsin, or about 990,000 tons per year. While some of this paper is either non-recyclable or too contaminated to be recycled, the majority is recyclable cardboard, newspapers, magazines, office paper and mixed paper, all of which are commodities with active markets and high market demand.

¹ From DNR 2002 Waste Characterization Study, <http://dnr.wi.gov/org/aw/wm/recycle/studies/index.html>

² From *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (3rd ed.), U.S. Environmental Protection Agency, <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>

Wisconsin law currently bans several types of recyclable paper from landfill disposal or incineration. However, mixed recyclable paper is not included in the bans, and the ban on office-type paper does not apply to households. While the recycling rates (ranging from 28 to 72 percent) for the banned paper materials are high compared to many other states, significant amounts are still going into landfills each year.

The Governor's Task Force on Waste Materials Recovery and Disposal recommended increased recovery of scrap (recyclable) paper in Wisconsin. The Task Force urged that the paper recycling requirements be expanded to include mixed waste paper and be more strongly enforced, especially for the business/commercial sector and for office paper coming from households. With that in mind, in order to increase the recycling rates for paper and thus reduce GHG emissions, this proposal would:

1. Add "mixed recyclable paper" to the list of paper categories required to be recovered by effective recycling programs in Wisconsin and remove the exception for office paper coming from households.
2. Increase education and outreach on paper recycling to households and businesses, improve collection services in areas or business sectors that are underserved, and create incentives and enforcement strategies for paper recycling.

2. After implementing the above measures, if a new waste characterization study shows that significant amounts of paper are still being landfilled, consider stronger measures to recover paper, such as a prohibition of landfill disposal of more than incidental quantities of recyclable paper.

8. Timetables, duration and stringency options: Development and passage of legislation would take at least one year. The expanded landfill bans would need to be phased in to allow local governments time to educate residents and landfills and the DNR to design and implement an inspection and enforcement program. Ideally, the initial expansion of the bans and associated incentives and penalties could be implemented by 2011-2012, with significant GHG reductions by 2014-2015. Duration would be indefinite.

9. Explanation of rough estimate of GHG reductions: The GHG reductions from this policy come both from reducing landfill methane emissions and from reducing the need for virgin materials in paper production. In particular, the reductions are due to increased forest carbon sequestration as forests are left intact rather than harvested for paper production. Because of the life-cycle approach, not all emissions reductions would occur within Wisconsin, though the state would share in global benefits from reduced GHG and there would be a potential to incorporate credits for waste management alternatives into a cap-and-trade system.

The estimates are based on data from the DNR's 2002 Waste Characterization Study, which estimated the amounts of materials generated and landfilled in Wisconsin each year. Estimates of 50 percent and 75 percent of landfilled recyclable paper were used to represent increased recycling as expanded landfill bans on paper were phased in. Next, these tonnages were multiplied by emissions factors calculated by the U.S. Environmental Protection Agency using a life-cycle analysis for each category of recyclable paper. These emissions factors represent the difference, in metric ton carbon dioxide equivalents (MTCO₂E), of recycling compared with landfilling a material.

10. Rough estimate of costs for selected years: With paper being diverted from landfills to recycling, the state would lose tipping fee revenues. Currently, the state receives \$4/ton from a recycling tipping fee and \$1.90/ton from other fees (principally an environmental repair fee) for solid waste disposed of at Wisconsin landfills. The table below shows the lost revenue under the 50 and 75 percent recycling scenarios. Aggregate annual revenue generated by the fees is approximately \$45 million.

Annual loss in state tipping fee revenue due to diversion of paper from landfills to recycling

Additional recycling of current tons landfilled	Lost recycling tipping fee revenue	Lost environmental repair and other fee revenue	Total revenue loss
50 percent (297,565 tons)	\$1,190,260	\$565,374	\$1,755,634
75 percent (446,346 tons)	\$1,785,384	\$848,057	\$2,633,441

Certain local governments that receive tipping fee revenues under local negotiated agreements would also lose a small proportion of these revenues as tonnages decreased.

11. Barriers to implementation:

Local recycling programs, landfills and waste haulers, and the DNR would need some additional resources to implement and maintain the expanded paper bans. Landfill operators, waste haulers, businesses and municipal recycling programs would all likely have to add equipment, training and/or other resources to comply with the stricter bans, and thus might oppose the change. Landfill operators (including local governments) would also lose tipping fee revenue due to less waste being landfilled. On the other hand, portions of the paper industry in Wisconsin would likely support expanded landfill bans as a means of increasing the supply of scrap paper available for use by recycle mills in Wisconsin.

**Wisconsin Global Warming Task Force Industry Workgroup Policy Option:
Reduce GHG emissions through increased recovery of untreated wood wastes
(revised 2/27/08)**

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1. **Workgroup:** Waste

2. **Policy name:** Reduce GHG emissions through increased recovery of untreated wood wastes

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3. **Policy type:** regulation/legislation, incentives

4. **Affected sectors, sub-sectors and/or entities:** landfill operators, incinerator operators, waste and recycling haulers, construction industry, municipalities, manufacturers, distributors, retailers

5. **Estimated greenhouse gas emissions reduction impact:** The following tables present a rough estimate of the savings in GHG emissions if 50 percent of recoverable untreated wood (modeled as dimensional lumber) currently generated and landfilled in Wisconsin each year were instead recycled or combusted in waste-to-energy facilities.

Annual reductions in GHG emissions, in metric ton carbon dioxide equivalents, from untreated wood (dimensional lumber) diverted from landfills to recycling or combustion

<u>Untreated Wood Type/Source</u>	Tons ¹ Landfilled	Emissions factor ² (MTCO ₂ e/ton) if recycled	Estimated percent recoverable ³	Recoverable Tons	Total savings (MTCO ₂ e) if 50% recycled
<u>Mixed/Multi-material (MSW) landfills</u>	607,650	-1.97	25%	151,913	149,634
<u>Mixed/ Construction & Demolition (C & D) Landfills</u>	8,800	-1.97	25%	2,200	2,167
<u>Pallets/MSW LFs</u>	76,926	-1.97	100%	76,926	75,772
Total	693,376			231,039	227,573

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<u>Untreated Wood Type/Source</u>	Tons Landfilled	Emissions factor (MTCO ₂ e/ton) if combusted	Estimated percent recoverable	Recoverable Tons	Total savings (MTCO ₂ e) if 50% combusted
<u>Mixed/MSW LFs</u>	607,650	-0.29	25%	151,913	22,027
<u>Mixed/C&D LFs</u>	8,800	-0.29	25%	2,200	319
<u>Pallets/MSW LFs</u>	76,926	-0.29	100%	76,926	11,154
Total	693,376			231,039	33,500

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6. **Estimated costs:** Construction companies, manufacturers, distributors and retailers could incur costs for equipment and labor to divert discarded wood and pallets to processing centers or waste-to-energy combustion facilities. Some of these costs could be offset by reduced landfill costs. Local governments

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¹ Untreated wood and pallets at multi-material municipal solid waste (MSW) landfills from DNR 2002 Waste Characterization Study, <http://dnr.wi.gov/org/aw/wm/recycle/studies/index.html>. C&D landfill tonnage based on estimated disposal in 3 active intermediate-size and 19 active small-size construction and demolition landfills located around the state.

² From *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (3rd ed.), U.S. Environmental Protection Agency, <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>. Emissions factor is for dimensional lumber.

³ Unpainted and usable for recycling or processing into wood-based products

could incur costs to adopt and enforce wood recovery ordinances. The state, landfills and some local governments would lose tipping fee revenue if less wood were landfilled.

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7. Specific description of policy proposal: This policy would reduce GHG emissions by diverting untreated dimensional lumber to either recycling or waste-to-energy combustion through a combination of local ordinances, financial incentives and reduced regulatory barriers.

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Though recycling and reuse of discarded wood has been increasing, untreated wood makes up about 13 percent of all materials disposed of in Wisconsin landfills each year.⁴ While this lumber represents carbon that is essentially stored in landfills (because the decomposition process is very slow), a greater climate benefit can be realized by either combusting the wood to recover energy (displacing generation by fossil fuels) or recycling it in products such as landscape mulch or engineered wood (i.e., chipboard and particle board), thus reducing the need to harvest new trees and allowing forests to grow and sequester more carbon.

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The Governor's Task Force on Waste Materials Recovery and Disposal urged increased recovery of clean, untreated wood waste for recycling/reuse and the further development of a market infrastructure to collect and process the materials. Based on those recommendations, this policy proposal is to:

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1. Require local governments to adopt ordinances requiring the recycling of wood waste generated in new construction, as part of the building permit process. Authorize DNR to waive this requirement for a local government that demonstrates that compliance would result in a net increase in GHG emissions due to transporting discarded wood greater distances or other local factors.

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2. Provide state-level funding and/or incentives (e.g., tax breaks and grants) to encourage development of the wood waste recycling/reuse infrastructure.

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3. Remove policy/regulatory barriers to increased recycling and reuse (e.g., replace the current requirement that a builder get a low-hazard exemption to recycle untreated, new construction wood with a self-implementing notification).

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4. Consider imposing a landfill ban on untreated wood if significant amounts continue to enter landfills.

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5. Include new projects to recover energy from combustion of wood wastes in the state's renewable energy portfolio.

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6. Revise policies that create financial incentives to dispose of wood in C & D landfills (e.g., subject wood and other wastes accepted at C & D landfills to state-imposed disposal taxes that now apply only at MSW sites).

8. Timetables, duration and stringency options: Development and passage of legislation would take at least one year. If incentives and local ordinances don't achieve significant increases in diversion, implementation of the ban would need to be phased in. This would allow time to educate builders and set up a more comprehensive collection infrastructure, and for DNR to design and implement an inspection and enforcement program. Ideally, the ordinance requirement could be implemented by 2011, with significant GHG reductions by 2014. Duration would be indefinite.

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9. Explanation of rough estimate of GHG reductions: The GHG reductions from this policy come either from reducing the need for virgin materials in lumber/wood products, thus allowing forests to grow and sequester carbon, or from reducing the need to burn fossil fuels by combusting wood waste in waste-to-energy facilities. The GHG reductions are significantly larger for recycling/reuse than for combustion due to the significant benefit of forest carbon sequestration when fewer trees are harvested. Because of the life-cycle approach, not all emissions reductions would occur within Wisconsin, though

⁴ Based on the 2002 Waste Characterization Study, which included only waste going to regular solid waste landfills and not the approximately 30 smaller, C&D-specific landfills.

the state would share in global benefits from reduced GHG and there would a potential to incorporate credits for waste management alternatives into a cap-and-trade system.

The estimates are based on data from the DNR’s 2002 Waste Characterization Study, which estimated the amounts of materials generated and landfilled in Wisconsin each year in municipal solid waste landfills (additional amounts are disposed of at C&D waste landfills). An estimate of recovery of 50 percent of landfilled untreated wood was used to represent increased diversion as the recommended policies were phased in. These tonnages were multiplied by an emissions factor calculated by the U.S. Environmental Protection Agency. The emissions factor represents the difference, in metric ton carbon dioxide equivalents, of recycling or combustion compared with landfilling a material.

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10. Rough estimate of costs for selected years: With untreated wood diverted from MSW landfills to recycling or incineration, the state would lose tipping fee revenues. Currently, the state receives \$4/ton from a recycling tipping fee and \$1.90/ton from other fees (principally an environmental repair fee) for solid waste disposed of at Wisconsin MSW landfills. The loss of revenue would be partly offset by new revenue gained by extending state taxes to wood and other wastes disposed of at C & D landfills. The table below shows the net lost revenue for the 50 percent recycling or combustion scenarios. Aggregate annual revenue from the fees is approximately \$45 million.

Certain local governments that receive payments from landfills under local negotiated agreements would also lose revenues as tonnages decreased.

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Annual loss in state tipping fee revenue due to diversion of untreated wood from landfills
(Revise to reflect revenue gained from C & D sites)

Additional recycling/combustion of current tons landfilled	Lost recycling tipping fee revenue	Lost environmental repair and other fee revenue	<u>Net</u> revenue loss
228,839 tons	\$915,356	\$434,794	\$1,350,150

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There would also be costs stemming from tax breaks and grants for wood recycling infrastructure development.

11. Barriers to implementation:

- Logistical:** The state would need to coordinate closely with local governments in developing a model ordinance. If a ban were implemented, a comprehensive inspection and enforcement program would need to be implemented to detect violations at construction sites or landfills. Builders could need additional training on how to separate and collect untreated lumber from construction and demolition projects, as well as provisions of local recycling ordinances.
- Financial:** Local governments would need resources for enforcing the new requirements. Construction companies, landfills, waste haulers and the DNR would need some additional resources to implement and maintain a wood landfilling ban. Builders or other groups responsible for diverting wood might need financial incentives to offset costs of setting up a large-scale collection system.
- Political:** There could be resistance from some local governments that would have to implement and enforce local ordinances requiring recycling at construction sites. Construction interests could oppose wood recovery ordinances or bans due to increased costs. For a wood landfilling ban, there could be resistance from landfill operators and owners and some local governments, in light of potential reduction in revenue from landfill tip fees and safety and health concerns associated with enforcing bans at disposal facilities.

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Wisconsin Global Warming Task Force
Waste Materials Recovery and Disposal
Work Group Policy Option

Reduce GHG emissions through enhancements to existing recycling programs.

1. **Work Group:** Waste Materials Recovery and Disposal.
2. **Policy Name:** Reduced GHG emissions through enhancements to recycling programs.
3. **Policy Type:** Executive action by the Governor’s office.
4. **Affected Sectors, Sub-Sectors and/or Entities:** Landfill operators, waste and recycling haulers, municipalities, residents, and businesses.
5. **Estimated Greenhouse Gas Emissions Reduction Impact:** It is not possible to provide a definite quantitative estimate of the greenhouse gas reductions associated with this policy. However, this policy should result in significant greenhouse gas reductions because it will provide important tools to allow local governments and others to increase recycling in Wisconsin. As is noted in other templates, recycling provides substantial reductions in greenhouse gas emissions by reducing the consumption of energy and resources, such as forests, to obtain raw materials for manufacturing. Examples of greenhouse gas reductions associated with recycling include:
 - 13.61 metric tons of CO₂ equivalent for every ton of aluminum recycled
 - 5.29 metric tons of CO₂ equivalent for every ton of mixed metals recycled
 - 3.89 metric tons of CO₂ equivalent for every ton of mixed paper recycled
 - 1.53 metric tons of CO₂ equivalent for every ton of mixed plastics recycled
 - 2.22 metric tons of CO₂ equivalent for every ton of typical recyclables

PART I - Summary of current GHG savings from recycling

DNR compiled estimates of the amounts of several “banned materials” generated in Wisconsin and recycled in 2006. These are based on:

- residential recycling amounts (primarily from single-family homes and buildings with 1-4 units); and
- commercial/business recycling, estimated based on the amount of residential recycling and the residential-commercial ratio of recyclables found in the 2002 Waste Characterization Study¹.

The sum of these numbers shows up in the “total tons” column below. This figure is then multiplied by the U.S. Environmental Protection Agency emissions factor² for that material category to get the metric ton carbon equivalent (MTCE) GHG emissions savings for the amount recycled. (EPA has specific emissions factors for mixed paper and mixed plastics.)

The MTCE figure is converted into metric ton carbon dioxide equivalents (MTCO₂E) and number of passenger vehicles removed from the road using the EPA’s GHG emissions calculator.³

¹ <http://dnr.wi.gov/org/aw/wm/recycle/studies/index.html>

² From *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (3rd ed.), U.S. Environmental Protection Agency, <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>

³ <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

Actual residential and estimated commercial recycling and resulting GHG savings, 2006

Category	Total tons	Emissions factor	MTCE	MTCO ₂ E	# of cars
Glass containers	103,527	0.09	9,317	34,162	6,257
Paper	921,125	1.06	976,393	3,580,108	655,697
Steel containers	25,973	0.5	12,987	47,619	8,721
Plastic containers	29,424	0.42	12,358	45,313	8,299
Aluminum containers	7,959	3.71	29,528	108,269	19,830
Total	1,088,008	--	1,040,582	3,815,471	698,804

PART II - Potential savings with recycling rate increase

DNR estimates the current recycling rate (that is, the amount of municipal solid waste, or MSW, generated in Wisconsin that is diverted for recycling) at 24 percent. EPA has an emissions factor for “mixed recyclables,” and using this gives a slightly higher GHG emissions savings than the above calculation.

Current overall recycling rate

	Recovered for recycling	In-state MSW generated	Emissions factor	MTCE	MTCO ₂ E
Tons	1,348,986	5,561,972	0.83	1,119,658	4,105,414
% of Total	24%				

Below are the GHG emissions savings if the overall recycling rate were to increase to 25, 26 or 29 percent (an increase of one, two or five percentage points).

Tons recycled with increased recycling rate

Increase over current rate	Additional tons recycled	Emissions factor	MTCE	MTCO ₂ E	# of cars
1% (25% total diversion)	55,620	0.83	46,164	169,268	31,001
2% (26% total diversion)	111,239	0.83	92,329	338,540	62,004
5% (29% total diversion)	278,099	0.83	230,822	846,347	155,009

6. **Estimated costs:** This policy is predicted to cost approximately \$5-10 million annually. This is the amount that has been historically diverted from Wisconsin’s recycling tax revenue to for general purpose spending. If this money were used instead to provide grants and other incentives to encourage the enhancement of recycling, it would likely result in significant greenhouse gas reductions.
7. **Specific Description of Policy Proposal:** This proposal seeks to reduce GHG emissions by enhancing Wisconsin’s present recycling programs. The waste materials recovery and disposal work group has identified four initiatives to enhance Wisconsin’s recycling: outreach and education, grants to improve existing programs and promote use of incentives, more effective deployment of recycling programs, and research.
 - a. Education and outreach. As discussed in Section 5 above, recycling results in significant greenhouse gas reductions, in addition to other environmental and economic benefits. Inadequate outreach and promotion of recycling are key obstacles to increasing recycling rates, so this initiative has the potential to increase participation in recycling programs by linking the simple act of recycling with the meaningful impact it can have on climate change.

Some consumers already believe recycling is an important tool for addressing climate change. In an October 2007 Harris poll, 31 percent of respondents listed recycling as the most

important thing they could do to reduce global warming. Most Wisconsin residents and entities, however, do not make this link. Trend research on recycling participation also suggests diminishing interest in recycling in general. A recent research effort by the National Recycling Coalition found over 100 million “sometimes” recyclers in the US who lacked the motivation and interest in recycling to participate routinely. The research indicated that in order to participate more in recycling these consumers need to feel more optimistic, hopeful, and accomplished by the act of recycling. Drawing a link between climate change, an area in which many feel powerless to act, and recycling, which is available at virtually everyone’s backstep, is a powerful way to boost recycling in Wisconsin and nationwide.

Providing education and outreach to link recycling to climate change is a low cost way to enhance waste recovery and reduce greenhouse gases, because it largely relies on greater utilization of existing recycling infrastructure. To prevent overlap, the waste materials recovery and disposal work group recommends that this education and outreach regarding recycling be performed by the entities set up under the Comprehensive Initiative to Support Voluntary Long-term Greenhouse Gas Emissions Reductions.

- b. Grants to responsible units to increase recycling. Wisconsin’s current two-year budget projects that the state will collect \$ -- million in tax revenue from landfill taxes and corporate income surcharges established specifically to pay for state and local recycling programs. Of that amount, \$---, or about -- % will be spent on recycling. The balance, \$-- million, will be used for state spending unrelated to recycling. Utilizing all state recycling funds solely for recycling would provide money to assist local governments in increasing recycling in their areas. Increased recycling could be achieved through a variety of initiatives, including increased enforcement of existing state and local recycling laws, equipment and public education costs associated with adding additional materials to recycling streams, implementing single-stream recycling programs and increasing the size of containers used for recycling. Local governments may also have unmet infrastructure needs for recycling containers for public spaces, special events, and government facilities that these grants could fulfill.

Grant process. Because local governments may have varying needs to help them increase recycling, the work group believes that it is important to allow local governments to determine what would be the most effective initiatives for them. Accordingly, this policy would establish a non-profit or quasi-governmental entity that would receive money from the recycling and renewable energy fund to provide as grants to local governments. These grants would be based in part on the projected net reductions in GHGs from the initiatives proposed by the local governments. This would help ensure that the most effective steps to reduce GHG are implemented.

- c. Effective deployment of recycling programs. In order to help ensure that recycling is fully implemented by local governments and those within their jurisdiction, it is important for the local governments to promote active recycling by all. Accordingly, this policy proposal would call for local governments to take steps to ensure that all businesses and other entities within their jurisdiction are fully implementing appropriate recycling plans. Local governments would be eligible to receive grants to fund technical assistance and outreach within business sectors and other entities to assist them in developing sustainable material recovery programs in support of the local governments’ overall plans.
- d. Research regarding further recycling opportunities. This policy statement would also call for a portion of the funds now presently diverted from the recycling and renewable energy fund to be made available for studies regarding further recycling opportunities. These studies could

include examination of bottlenecks in the recycling system (shortage of single-stream processing capacity, limited markets for certain materials), gaps in collection infrastructure (businesses, underserved communities, public events and spaces), study of best practices to enhance recovery in problem areas, and examining the sources of discarded material to identify the greatest potential for recovery.

8. **Timetables, Duration, and Stringency of Options:** This policy statement would call for protection of all recycling and renewable energy funds by year 2009 and for use of those funds for the above policies during that year and all years thereafter.
9. **Explanation of Rough Estimate GHG Reductions:** Because many of the initiatives described would be customized to meet the needs of local governments, it is difficult to quantify specific greenhouse gas reductions associated with this set of policies. Since recycling generates significant greenhouse gas reductions, the projects and programs supported by the policies in this template would be screened for their potential impact on greenhouse gases. Because the policies provide the necessary tools for local governments and others to increase recycling, they are anticipated to lead to significant improvements in both recycling and greenhouse gas reductions.
10. **Rough Estimate of Costs for Selected Years:** The cost of this policy is the amount of money that is presently diverted from the recycling and renewable energy fund.
11. **Barriers to Implementation:** The primary barrier to implementation would be the fact that the use of all recycling and renewable energy funds would prevent that money from being used as general revenue for the state. Accordingly, there will likely be pressure to continue to divert the funds to the general revenue.
12. **Other Factors:**

February 2008

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³ <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

From: Brian Tippetts
Sent: Monday, February 18, 2008 1:03 PM
To: DNR GLOBALWARM TF COMMENTS
Subject: Comments for Global Warming Task Force

Dear Global Warming Task Force members:

Thank you for your work. As a member of the Governor's Task Force on Waste Materials Recovery and Disposal I particularly appreciate your efforts.

Please consider these thoughts in your work.

- Wastes are huge contributors of global warming by their very nature of being waste. Waste is the result of inefficient use of resources and in particular energy.
- Landfills are monuments to our shortcomings, not to mention their direct contribution to potent green house gasses.
- Managing local waste locally encourages and empowers communities to be responsible for wastes. To the degree we ship wastes to regional landfills, we circumvent that close tie in with responsibility. There are also significant global warming impacts related to transporting waste significant distances to landfills.
- Improved waste management and recycling needs to be a high priority because:
 - #1 Wastes have huge impacts on global warming
 - #2 Everyone...homeowners, students, business owners, customers, and tourists touch waste every day and as such can personally do something to improve our situation.

We need to do all we can to reduce landfill usage through the 3 Rs of Reduce, Reuse, Recycle... **And** in accordance with the Governor's Waste Task Force we need to re-evaluate the merits of using the remaining wastes as a renewable energy in modern waste-to energy facilities. (*Landfill gas projects have merit but are far less efficient at extracting energy from waste than modern waste-to-energy facilities. Unlike landfills, modern waste-to-energy facilities have no carbon footprint.*)

Thank you for your time.
Brian R. Tippetts, Solid Waste Director
La Crosse County
La Crosse, WI

**Material for Ad-hoc Waste Materials Recovery and Disposal Group Discussion
Responses to the group's questions about landfill methane emissions discussed in the
Food Waste Template**

From: Murray, Sarah C - DNR

Subject: Answers for waste group

Here are a couple of info bits for the revised policy templates for the waste group.

1. The "mixed recyclables" category and associated emissions factor are based on a weighted average (by tons recycled in 2003) of the emissions factors for the following materials: aluminum cans, steel cans, glass, HDPE, LDPE, PET, corrugated cardboard, magazines/third-class mail, newspaper, office paper, phonebooks, textbooks, medium-density fiberboard and dimensional lumber.
2. Here is a description from the EPA report underlying the WARM model of how it calculates the amount of methane that is captured from landfills:

The landfill recovery scenario is based on estimated recovery rates and percentages of waste disposed in landfills with no recovery, landfills with only flaring, and landfills with landfill-gas-to-energy projects for the year 2004. According to the researchers' estimates, 59 percent of all landfill CH₄ was generated at landfills with recovery systems, and the remaining 41 percent was generated at landfills without landfill gas (LFG) recovery.²⁰ Of the 59 percent of all CH₄ generated at landfills with LFG recovery, 53 percent (or 31 percent of all CH₄) was generated at landfills that use LFG to generate electricity, and 47 percent (or 28 percent of all CH₄) at landfills that flare LFG. The assumption that 53 percent of landfills recovering CH₄ use it to generate electricity is subject to change over time based upon changes in the cost of recovery, and the potential payback. Additionally, new technologies may arise that use recovered CH₄ for purposes other than generating electricity.

Lynn (or Brad) may have numbers on how these percentages compare to Wisconsin--that is, the percentage of all WI landfills that have landfill gas recovery systems and the percentage of those that recover methane for electricity vs. just flaring it. Brad would also have some more solid numbers than I was able to provide Friday on the percentage of methane that is actually captured at landfills with gas recovery systems.

Here is a discussion of the GHG emissions/carbon sinks associated with landfills--as you see, the model does give credit for avoided utility emissions equivalent to the amount of methane recovered for energy production at landfills. This decreases the emissions factor associated with landfilling organic materials such as food waste.

Landfilling: When organic matter is landfilled, some of this matter decomposes anaerobically and releases CH₄, a GHG. Some of the organic matter never decomposes at all; instead, the carbon becomes stored in the landfill. (Landfilling of metals and plastics does not result in CH₄ emissions or carbon storage.)

At some landfills, virtually all of the CH₄ produced is released to the atmosphere. At others, CH₄ is captured for flaring or combustion with energy recovery (e.g., electricity production).

Almost all of the captured CH₄ is converted to CO₂, but that CO₂ is not counted in this study as a GHG because it is biogenic. With combustion of CH₄ for energy recovery, emission factors reflect the electric utility GHG emissions avoided. Regardless of the fate of the CH₄, the landfill carbon storage associated with landfilling of some organic materials is accounted for. GHG emissions and carbon sinks from landfilling are described in Chapter 6.

For food waste, the emissions factor was reduced by .01 to take into account avoided utility emissions due to landfill gas electricity generation, and by .02 for the carbon that doesn't decompose but is stored in the landfill.

Chapter 6 of the report has a full discussion of how EPA calculated landfill-related emissions factors--this might be useful to Lynn or Brad in deciding whether the food waste emissions factor is too high because of better landfill gas recovery in Wisconsin:

<http://www.epa.gov/climatechange/wycd/waste/downloads/chapter6.pdf>

A couple of highlights:

1. EPA estimates 75% efficiency for landfills with gas recovery systems.
2. For landfills that recovery energy from landfill gases, EPA estimated a 15 percent efficiency loss during system down time (during which gas is flared rather than converted to electricity) in calculating the avoided utility emissions.
3. The last three pages of the chapter include emissions factors for landfills without LFG capture, with capture but no electricity generation, and with capture and electricity generation. They also include sensitivity analysis for more efficient landfill gas capture. For instance, if 60% of waste is disposed of at landfills with methane recovery (higher than the national average), the emissions factor for food waste is decreased by .01 MTCE. With increased efficiency of gas capture systems, the emissions factor is reduced by .03 for 85% efficiency and .08 for 95% efficiency.

If we have a good picture of the percentages of landfills in Wisconsin with methane recovery systems, including flaring vs. electricity generation, and how efficient they are (which I think we do), we could modify the emissions factor for food waste in the template.

Finally, I realized that in the templates it may be clearer if we change the emissions factors to MTCO₂E rather than MTCE, so the multiplication is obvious--Brad had done this for wood, but I didn't on the others. (So the GHG savings are in MTCO₂E, but looking across the tables the multiplication isn't obvious because I left the emissions factor as MTCE). This is an easy change I can make--just let me know if you'd like me to send you the numbers or make edits to the templates myself.

Sorry for the long e-mail--I hope this makes sense. Let me know if you have questions.

Sarah

From: Wolbert, Brad - DNR

Subject: RE: food waste template and landfill gas capture

I wanted to quickly provide my thoughts regarding the information Sarah Murray provided ~~below~~ ^{above} regarding the accuracy of EPA's emissions factor for food waste diversion from landfills based on Wisconsin conditions. Bottom line: I don't believe we have enough information to modify the EPA estimate.

Wisconsin generally has a higher percentage of landfills with gas recovery systems, and more with gas-to-energy systems, than the national average. I would suggest that once gas collection systems are in place, landfills in Wisconsin also may be more efficient in capturing gas than equivalent landfills in other states, thanks to the efforts of landfill owners and our own emphasis the past few years in reducing GHG emissions and odors from this source.

HOWEVER -- the efficiency estimate of 75% is very uncertain to start with (some researchers think it might be a bit higher, some think it is in fact much lower) and can't be verified by direct measurement yet. It is also a lifetime estimate, meaning it estimates emissions over the entire life of a landfill, including the time before a cap or gas extraction equipment is installed (usually a few years after waste is first placed). Food waste tends to be on the front end of the decomposition curve, and is probably one of the first landfilled materials to generate methane.

On balance, given how little we know about gas collection efficiency and how that relates to food waste gas production in particular, I think there is very little basis for substituting another number for the EPA emissions factor.

Brad

MEETING NOTES

Governor's Task Force on Global Warming
Ad-hoc Waste Materials Recovery and Disposal Work Group
Friday, February 29, 2008, 12:00 noon to 3:00 p.m.
Room 613, State Natural Resources Building (GEF 2)
101 S. Webster Street, Madison

Members in attendance:

Lynn Morgan (Broydrick & Associates), Keith Reopelle, Chair (Clean Wisconsin), John Clancy (Godfrey & Kahn – Forest Country Potawatomi Community)

Members on phone:

Gary Zajicek (Veridian Homes), John Piotrowski (PCA), Bill Oemichen (Wisconsin Federation of Cooperatives), Genise Smith-Watkins (PepsiCo)

Others in attendance:

Kelly McDowell (WI Beverage Assoc., Miller Brewing), Nick Sayen (DNR), Sarah Murray, on phone (DNR)

1) The meeting began with a quick welcome and review of agenda. Keith spoke about the progress of the overall Task Force. There were more people on the phone than in the past, so everyone re-introduced themselves.

2) Review of electronics reuse & recycling template

Editing efforts to date were accepted. There was discussion of whether or not legislative action could be taken before the HDTV conversion and the group agreed that was unlikely. Language will be added regarding the urgency of action in light of the coming conversion (included resources to DNR to implement outreach efforts - website, coordination with retailers, etc.) Lynn suggested adding language regarding incineration. Carbon equivalent numbers will be removed leaving just CO₂ equivalents.

(3) Review of food waste template

Section 7, part 4 - language will be tweaked suggesting something like "a strategy to create incentives for preferred hierarchy of options." The group asked that Sarah check the assumptions of the EPA emission reductions model, if possible, to verify the assumption of percentage of landfills capturing methane for energy recovery. Language will be added/tweaked to suggest the importance of variability and study goals on the resulting GHG savings

(4) Review of increased paper recycling template

The group made no revisions to this template and the only changes to review involved adjusting numbers.

(5) Review of waste wood template

Editing efforts to date were mainly accepted. Language will be revised throughout to include "re-use" along with recycling. Part 5 of Section 7 is likely not needed and can be removed. Language regarding funding sources will be added to section 10. Section 10 will also be updated to reflect revenue gained from C&D sites. The tables in section 5 will be re-organized to clarify.

(6) Review of enhanced recycling program template

The template will be revised for formatting purposes. Legislation will be added to section 3. Language will be added to section 5 to clarify the use of the .83 emission factor reflecting the "market basket" of recycled materials. Language will be added to section 6 regarding the diversion of funding from the recycling funds and identifying a more suitable source for the renewable energy/econ. development projects. Up-to-date budget #'s will be added to section 7b. Language will be revised to clarify the grant purposes and the grant process section will be revised to refer to DNR and eliminate the quasi-govt. entity. Section 7c will be revised to be more specific about commercial and public places. Section 7d will be revised to be more specific or eliminated.

Also, Brad and Cynthia will be asked to review the template for the purposes of:

- a) suggesting any improvements to the demonstration & pilot grants now administered by DNR
- b) clarifying and suggesting any improvements in enforcement
- c) looking for opportunities to incentivize the grants administered by DNR to RUs (or, more generally, the state/RU relationship)
- d) identify and specific studies that would be most useful for including in section 7d.

(7) Next steps

4 templates (eWaste, food waste, paper waste & wood waste) are essentially finished. Group members will be asked to complete edits and revisions on Monday. Once complete those will be circulated for review – approx. 24 hours. Assuming there are no new objections/issues, this would allow these templates to be complete and posted by the deadline on the 5th.

The final template, enhanced recycling programs, will be edited more heavily early next week and will be reviewed by Brad Wolbert and Cynthia Moore. Ideally this will be circulated to the group for reviewed and also approved close to the March 5th deadline.