
Final Report of the Governor's Task Force on Waste Materials Recovery and Disposal

Submitted to Governor Jim Doyle
December 2006



Wisconsin's material and solid waste future—the choices are ours

About this publication

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On the front cover:

Top: A collection truck on its route. Photo courtesy Veolia ES Solid Waste, Inc.

Center: Workers on a sort line in a Waste Management facility. Photo courtesy WM Recycle America.

Bottom: Concrete recycling in Milwaukee. Photo courtesy Milwaukee Department of Public Works.

On the back cover:

Top left: Workers recycle metal on a construction site. Photo courtesy WasteCap Wisconsin, Inc.

Top right: A truck collects curbside recyclables. Photo courtesy Johns Disposal Service, Inc.

Bottom left: A worker sorts electronic equipment for recycling. Photo courtesy Cascade Asset Management, LLC.

Bottom right: Students learn about vermiculture at Hawley Elementary School in Milwaukee, a Green & Healthy School. Photo courtesy Amy Fare of Hawley Elementary.

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Executive Summary

In Executive Order #106 (June 14, 2005), Governor Doyle created the Governor's Task Force on Waste Materials Recovery and Disposal and gave it the following mission:

- To study and make recommendations regarding the economics of landfilling and recycling solid wastes, including the full environmental costs and benefits, and the extent to which they are reflected in prices and associated fees collected by the state.
- To review the extent to which materials with economic value are lost to landfilling and to recommend ways to maximize the productive use of waste materials, including materials recycling and composting.
- To study and recommend ways that Wisconsin can minimize the generation of waste materials including, incentives for waste material reduction and reuse.
- To study the current management of toxic and nontoxic solid wastes and to recommend ways to ensure that these wastes are managed in a manner that minimizes present environmental impacts and potential burdens to future generations.
- To consider the role of Wisconsin municipalities, businesses and residents in the use, management and disposal of waste materials.

The Governor further instructed the Task Force to generate a “comprehensive strategy” for dealing with waste generation, recovery and disposal issues. In doing so, the need for a clear statement of goals – or vision – became apparent. In order to provide an overall context for its recommendations, therefore, the Task Force developed a statement of its vision for solid waste and resource management in Wisconsin.

Simply put, the objective is to move towards

ecological and environmental sustainability through a series of complementary actions designed to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment, simultaneously working to minimize total financial, social and environmental costs. Our vision for Wisconsin, therefore, can be stated as follows:

In a manner designed to minimize environmental, economic, and social costs to the residents of Wisconsin and beyond, the State of Wisconsin shall achieve and maintain an integrated materials management system consisting of enhanced producer responsibility for products, effective resource recycling and recovery, and responsible waste disposal – all designed to promote ecological and environmental sustainability.

We can elaborate further by discussing the meaning of certain key phrases in the vision described above.

“**In a manner designed to minimize environmental, economic, and social costs**” means that policies, regulations, and corresponding activities should be developed and implemented first with a true understanding of environmental, economic, and social costs and second in a manner designed to minimize total costs.

In at least some cases, the “true” cost of creating a product is not borne by the manufacturer, but by the entity required to deal with its disposal. This may result in additional costs to Wisconsin consumers and communities, including both current and future generations, or it may place a significant burden on municipal and private resources responsible for

waste recycling and disposal. A fair assessment of the “true” environmental cost of product creation, consumption, and disposal – cradle to grave – is necessary to assure that those who benefit from the manufacture, sale or purchase of a product share in the cost and consequences of disposal as well.

Moreover, simple comparisons may not adequately reflect complex economics. A \$30 landfill tipping fee, for example, in all likelihood cannot be compared to, say, a \$45 unit cost for recycling by a particular municipality. One has to determine whether they both account for necessary expenses like collection and transportation. Does the recycling “cost” include the offsetting value of materials sold for recycling? Are environmental impacts - both current and long-term - included? In such cases, there has to be an apples-to-apples comparison to evaluate the cost of various waste management options. The Task Force believes that the “true cost” of specific waste management decisions should play a significant role in future policy-making.

“Integrated materials management system” means a system of policy and regulatory requirements designed to work together in a series of complementary actions to direct the conduct of producers, consumers, and waste handlers so that each one anticipates the conduct of the other and acts to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment.

“Enhanced producer responsibility for products” means that the fate of any given product after use is accounted for in product design, manufacturing, and distribution. Manufacturers are already responsible for environmental impacts associated with the production of their products. As things now stand, however, this responsibility typically ends

once a product is sold. Enhanced product responsibility would require, first, that the amount of toxic and hazardous components be substantially reduced if not eliminated, and second, that manufacturers would design, manufacture, and distribute products in a manner designed to promote reclamation and to minimize the need for disposal.

Action by Wisconsin businesses and consumers to promote a more circular approach from raw materials to product back to raw materials for other products (rather than a linear movement from product towards waste and disposal) could result in benefits both within the state and in Wisconsin’s competitiveness in a world market. The increasing volatility of energy and raw material prices will eventually require attention and force this change anyway. Leveraging the state’s manufacturing experience in combination with research and development by the university and technical college system could accelerate this movement.

“Effective resource recycling and recovery” means the development and enforcement of effective programs to identify the useful components of solid waste, to sort and recover such resources, and to develop markets for recovered resources. An effective program for resource recycling and recovery is likely to require regional cooperation.

This is a report by a Task Force charged with addressing “waste” issues and the word “waste” appears frequently in the text. The Task Force recognizes, however, as must Wisconsin’s residents and business leaders, that “waste” discarded instead of recycled or recovered can turn out to be a resource lost. While landfills play a valuable and necessary role in the waste management system, the value of material placed in a landfill is greatly reduced except for energy that may be recovered by capturing gases from decomposing waste for the generation of electricity. Every product or package we landfill represents manufacturing production (including

raw materials and energy) that is effectively lost. The current solid waste system must evolve from one designed for disposal to one optimized for recovery and reuse. Better still, we should, where we reasonably can, prevent the waste from being generated in the first place.

“Responsible waste disposal” means disposal only when necessary, and then in a manner designed to minimize environmental impacts. Landfills, for example, should be designed and operated to minimize the need for engineering controls after the landfill is closed.

“Ecological and environmental sustainability” is fully achieved when we find ways to meet our resource and energy needs today without compromising the ability of future generations to meet their needs as well.

A Step Forward

There is precedent in Wisconsin to achieve a vision such as this creatively and forthrightly. The State Seal with the word “Forward” exemplifies Wisconsin’s historic leadership in environmental and consumer protection, strong infrastructure supporting economic development, and research and outreach by its education system. The Task Force hopes that this report is another step “forward” in the protection of the environmental and economic interests of Wisconsin.

How is conduct changed in away that moves us towards the vision established by the Task Force? The Task Force sought to acknowledge and, where appropriate, take advantage of the following forces:

Market Forces

Certain market forces are moving us towards a more integrated system anyway. Producers reduce packaging, for example, or their reliance on more exotic and expensive components, not to reduce waste necessarily, but simply to reduce the cost of produc-

tion. Producers are still driven by costs. Reducing costs can increase profits.

Good Will

Producers may perceive some competitive advantage by offering so-called “green” products. Certain consumer trends tend to favor products designed to promote recovery or to minimize environmental impacts upon disposal. Or, producers in certain industries manage their own “take-back” programs, which facilitate the recovery of certain problematic wastes as, for example, can be found in many electronic goods.

Legislation and Regulation

Where necessary, the government can step in to force conduct designed to make the whole system work better. This might take the form of incentives to encourage desirable conduct or mandates and penalties where more aggressive action is required to direct or prohibit other forms of conduct.

Market forces and good will tend to function on their own, so the Task Force has focused on recommendations involving legislation, rule-making, and actions by stakeholders designed to contribute to an integrated overall system for effective materials management.

Funding

The issue of funding is a sensitive one. The Task Force is wary of unfunded mandates. In many respects, recommendations set forth in this report, to the extent they reorganize current programs, may not require net additional funding. At the same time, the Task Force recognizes that the implementation of its recommendations as a comprehensive package will require additional funding. Although based on rough, order-of-magnitude calculations, the level of funding required to implement the recommendations in this report is likely to range from \$6 million

to \$10 million in the first year and \$5 to \$7 million annually thereafter.

The Task Force, composed as it is by members with diverse views on taxes, fees, and related matters, found it challenging to recommend a mechanism for funding the implementation of its recommendations. We have assumed that general purpose revenue is unlikely to be made available for waste management programs.

Most recycling and waste reduction programs are funded through a non-lapsable trust fund, which is commonly referred to as the “Recycling Fund.” The Recycling Fund receives revenue from a recycling surcharge on certain tax liabilities and a landfill tipping fee. The Recycling Fund, in turn, is used to support a variety of services, including administrative staffing, recycling demonstration grants, and grants to local units of government responsible for recycling programs (called “Responsible Units” or “RUs”).

As reported by the Wisconsin Legislative Fiscal Bureau and the Department of Natural Resources (DNR), the revenue generated for the Recycling Fund generally exceeds expenses, in some years by more than \$10 million. The figure varies with each budget cycle, but there has consistently been a surplus in this account. A pattern has developed by which significant portions of these surplus funds have been diverted to the general fund for budget balancing purposes. According to the Legislative Fiscal Bureau and the DNR, the amounts transferred in 2003-04, 2004-05 and 2005-06, for example, were roughly \$7.3 million, \$6.8 million and \$22 million, respectively.

Based on current projections, these funds, if retained for use on waste reduction and recycling initiatives as set forth in this report, would be adequate to implement and sustain these recommendations in the coming years. Indeed, as set forth in Recommendation A3, the Task Force urges the Governor and Legislature to preserve these funds for use as

intended on waste reduction and recycling initiatives in general and implementation of these recommendations in particular. With such action, these recommendations as a whole can be implemented without the need for additional taxes or surcharges. The Task Force believes that this is a significant factor and one that supports the implementation of these recommendations as soon as possible. This will accelerate efforts to achieve a fully integrated solid waste management program in Wisconsin.

Recommendations

One final word before presenting the Task Force recommendations. There is no silver bullet. An effective state policy likely depends on a wide range of actions and a combination of measures designed to achieve overall state objectives. What is required to achieve these objectives will change over time, just as markets and public habits will change, and the state must be prepared to adapt over time as well. A creative and flexible approach will help Wisconsin adhere to its proud history of effective management of natural resources.

Task Force recommendations are set forth according to the concepts set forth in our Vision Statement. This reflects, in our view, a logical presentation of actions necessary to implement an integrated system that manages the diverse stages of waste generation, handling, recycling, and disposal. In the report that follows, each recommendation is preceded by a discussion designed to provide background information relevant to the recommendation itself. Along with other sections of the report, these discussions provide context for policymakers as steps are taken to implement these recommendations.

A. Minimize Environmental, Economic and Social Costs

- A1. **Improve and expand the use of economic analysis in solid waste policy and management decisions.** The objective is to base

policy and regulatory decisions on recognition of the full social costs and benefits of alternative strategies, including external costs and benefits. Steps to be taken include: (a) increasing the expertise of environmental and conservation staff with training in environmental economics, (b) adding an environmental economist to the DNR, (c) conducting economic research that directly addresses emerging solid waste policy and regulatory issues, (d) establishing pilot projects to evaluate the efficacy of alternative incentive-based mechanisms, and (e) factoring external costs beyond state boundaries into Wisconsin policy decisions on solid waste management.

A2. Promote effective solid waste planning and implementation as well as regional cooperation for both.

The current state framework fails to reflect certain key characteristics of “integrated solid waste management,” which should include planning and management for all forms of solid waste, from recycling to household hazardous materials to the siting of landfills and incinerators. As a result, fractured and disparate services are available through programs that fall far short of a fully integrated system. Steps to be taken include: (a) conducting pilot studies to evaluate options for comprehensive solid waste planning, The objective is to base policy and regulatory decisions on recognition of the full social costs and benefits of alternative strategies, including external costs and benefits. Steps to be taken include: (a) increasing the expertise of environmental and conservation staff with training in environmental economics.

A3. Preserve funds generated by the Recycling Fee and appropriate them to implement these recommendations and other

solid waste reduction and beneficial reuse programming. The objective is to preserve all funds generated through the Recycling Fee to implement recommendations set forth in this report. Steps to be taken include: (a) banning diversions from the segregated fund so that monies raised from the Recycling Fee are preserved for their intended purposes, and (b) appropriating all revenue from the segregated fund to implement these recommendations and other recycling, beneficial reuse and waste reduction programs.

A4. Modify the formula for grants from the Recycling Fund to meet the needs of RUs more effectively.

The current formula used to distribute grant monies prevents many RUs from obtaining all of the funding they might be eligible to receive. This has resulted in both under-funded RUs and, in some cases, over-funded RUs. Steps to be taken include: (a) modifying the formula used to calculate the distribution of RU grant monies to assure equitable distribution among RUs and to more adequately meet the cost of effective recycling programs and other waste reduction and beneficial reuse programs, and (b) incorporating additional recycling and beneficial reuse programs into the matrix of allowable expenses for reimbursement under the terms of an RU grant.

B. Enhance Producer Responsibility for Products

B1. Maximize the collection and reuse of discarded electronic devices. The goal is to eliminate disposal of electronic waste through state legislation consistent with similar initiatives in the upper Midwest. Steps to be taken include: (a) establishing state policy, consistent with policies in neighboring states,

to promote environmentally sound recycling and reuse of discarded televisions, monitors, laptops and desktop computers, and (b) banning the disposal of such devices by the end of 2010. The resulting policies should not unduly burden government and should embrace principles of shared responsibility among consumers, producers and state and local governments.

- B2. Require effective product stewardship (producer responsibility for the fate of their products).** The goal is to extend producer responsibility to include end-of-life costs associated with recycling and disposal. Steps to be taken include: (a) promoting voluntary practices by industry to recover, reclaim and recycle products at the end of their life cycle, (b) establishing mandatory product take-back and collection programs in all cases where such programs are cost effective compared to other systems for recycling, (c) prohibiting the use and incorporation of toxic materials in electronic and other products, and (d) supporting the establishment of accessible recovery facilities.

C. Promote Effective Resource Recycling and Recovery

- C1. Recover more construction and demolition debris and other sources of wood waste.** Construction and demolition (C&D) debris represents approximately 28.7% of Wisconsin's municipal solid waste (about 1.4 million tons per year). Other wood waste (e.g., branches, pallets) constitute another 2.9%. The objective is to recover as much of this waste as possible for beneficial reuse. Steps to be taken include: (a) initiating market development and research on the recovery and reuse of C&D waste and supporting the development of an infrastruc-

ture for recycling and marketing C&D waste in general and clean, untreated wood in particular, (b) promoting the adoption of local ordinances to require C&D recycling as part of the construction permitting process, (c) removing regulatory barriers to waste reduction, reuse and recycling where environmentally appropriate, and (d) instructing the Wisconsin Department of Transportation to determine whether and how shingles can be safely incorporated into road construction projects and recycled wood can be used for highway beautification and erosion control projects.

- C2. Recover more scrap paper.** Unrecovered paper represents approximately 20.8% of municipal solid waste (about 990,000 tons per year). The goal is to recover more waste paper for productive use and to reduce the amount of usable paper in landfills to less than 15% in five years and less than 10% in ten years. Steps to be taken include: (a) increasing and promoting household and business recycling of all recoverable paper, (b) making recycling easier, (c) increasing education on the value of recovered paper as a resource, (d) creating stronger incentives and penalties for waste paper management, and (e) reducing the contamination of recoverable waste paper.
- C3. Reduce and recover more organics.** Food residuals constitute 10.2% of total municipal solid waste and food-soiled compostable paper constitutes another 4.8% (about 487,000 and 228,000 tons, respectively, per year). The goal is to increase the diversion of food residuals, food soiled paper, and clean wood, referred to here as "source-separated organics," from disposal for composting or other productive use. Steps to be taken include: (a) identifying sources of source-separated or-

organics in Wisconsin's municipal solid waste and promoting education on options for reduction and diversion, (b) initiating research into composting organics from commercial properties, (c) developing and promoting a hierarchy for the recovery of source-separated organics, and (d) developing a strategy to reduce barriers and increase the safe diversion of source-separated organics.

- C4. Recover more waste generated by commercial properties.** The objective is to recover more waste from commercial sources, as opposed to residential sources, for purposes of effective resource collection and to reduce overall disposal of these materials. Steps to be taken include: (a) increasing education and information to Wisconsin businesses on what is required to be recycled, and (b) increasing the effectiveness and enforcement of current recycling ordinances through the development of business recycling plans.
- C5. Re-examine the feasibility of a beverage container deposit law.** As many as half of the beverage containers generated in Wisconsin remain unrecovered through conventional recycling programs based on curbside and drop-off collection. For 2005, the DNR has estimated the economic value of recyclables that are landfilled at \$21 million for aluminum cans and \$19 million for plastic containers. The objective is to optimize the recovery of all types of beverage containers in order to save resources and energy and to minimize the disposal of these materials. The principal step to be taken is to determine the most effective program attributes and plans for a beverage container deposit law that will work in Wisconsin in concert with existing recycling programs.

- C6. Conduct statewide waste generation and disposal studies at least every five (5) years.** In light of the potential for additional changes in the characterization and composition of waste relating to such things as new products, changing consumer habits and related matters, an accurate understanding of the solid waste stream is necessary to develop effective management policies. The goal is to avoid significant, unexpected changes in the solid waste stream before management systems are in place to handle changes in a responsible manner. The principal step to be taken is to mandate statewide waste generation and disposal studies every five (5) years.

D. Promote Responsible Waste Disposal

- D1. Enhance regulation of construction and demolition debris landfills.** DNR studies suggest that leachate collected from C&D landfills contains sulfate, manganese, chloride and other potential contaminants. Odor and risk of gas migration from hydrogen sulfide is a concern. The objective is to increase protection of human health and the environment by enhancing regulation of C&D landfills. Steps to be taken include: (a) evaluating the extent to which existing C&D landfills are adversely impacting the environment, and (b) upgrading Administrative Code requirements for C&D landfills as appropriate.
- D2. Assure adequate financial assurance by landfill operators.** Three primary types of financial assurance apply to Wisconsin landfills - closure, long term care and remediation. The goal is to ensure that the owner financial responsibility system - on both a short and long-term basis - is protective of the environment and minimizes liability to the citizens of the State of Wisconsin. Steps

to be taken include: (a) defining a period for proof of financial responsibility consistent with how long funding should be available for long-term care based on design and operating parameters, (b) providing for accessible and reliable remediation coverage for active and closed sites, (c) evaluating alternative means, such as a state insurance pool, of providing for long-term care and/or remediation at landfills, (d) ensuring uniform enforcement of current and future requirements for financial assurance, (e) eliminating the net worth option as a financial assurance mechanism, and (f) evaluating whether cost estimates used by the DNR in financial assurance calculations are adequate to assure the availability of funds when the need arises and, if not, implement necessary changes.

D3. **Revise the waste facility siting process.**

The objective is to improve public participation in the local siting process and to revise and simplify certain aspects of the landfill review process for regulatory approval. Steps to be taken include: (a) ensuring adequate and representative public participation in the local siting committee process, (b) educating the public on the roles of the siting committee and the local governmental body, (c) studying whether the needs analysis can be streamlined and made more effective, and (d) studying aspects of the landfill siting process to ensure that affected municipalities (town, city, village and counties) have adequate ability to have their needs and impacts addressed.

E. **Promote Ecological and Environmental Sustainability**

E1. **Expand the disposal ban to other domestic and agricultural universal wastes.** Wisconsin currently requires regulated businesses

to recover several commonly used products called “universal wastes” (e.g., lamps, batteries), restricting their disposal because of the potential toxic nature of the products or certain components therein. The objective is to prevent the disposal of residential and agricultural universal waste. Steps to be taken include: (a) updating the statutes and Administrative Code to ban universal waste from landfills and incinerators for all generators, (b) communicating the reasons for new requirements to residential and agricultural generators of universal waste, (c) supporting the establishment of accessible recovery facilities, and (d) expanding the DNR’s citation enforcement authority for universal waste.

E2. **Ban the disposal of used oil filters and oil absorbent materials.**

The objective is to restrict the disposal of absorbents containing large volumes of waste oil. The principal step to be taken is to enact a landfill ban on used oil filters and other oil-absorbent materials consistent with recommendations made by the Department of Commerce in 2005.

E3. **Develop and adopt a responsible mechanism to dispose of unused pharmaceuticals.**

Endocrine disruptors and other pharmaceuticals have been found in Wisconsin waters and fauna. The objective is to provide a responsible way to dispose of unused pharmaceuticals to prevent their uncontrolled release into the environment. The principal step to be taken, until a federal solution is enacted, is to research and develop an effective mechanism to recover and dispose of unused pharmaceuticals.

E4. **Develop appropriate restrictions on open burning and on-site burying.**

Land impacts

and air emissions associated with the disposal of garbage generated by single-family residences are a significant concern. The objective is to restrict the disposal of household solid waste on one's own property and to improve state and local enforcement of corresponding laws. Steps to be taken include: (a) authorizing the DNR to issue citations for open burning consistent with current law, (b) promoting a burn barrel education effort, (c) phasing out the statutory exemption that prevents regulation of household waste disposal on one's own property, and (d) phasing out exemptions in the DNR's solid waste and air management programs that allow households to open burn certain solid waste.

- E5. **Require state purchasing practices to favor products generated from recycled materials and to promote recycling by vendors.** The objective is to promote the use of recycled materials and to create new market opportunities for Wisconsin business. Steps to be taken include: (a) supporting the development and utilization of recycled materials by requiring the purchase of recycled products by the State of Wisconsin where suitable, (b) giving preference in state purchasing for services to those companies that utilize recycled materials, (c) supporting the development of new recycled and high-recycled content products by Wisconsin companies, (d) increasing "deconstruction" evaluations in state demolition contracts, and (e) requiring state agencies and the University of Wisconsin System to give special consideration to vendors offering take-back programs and to evaluate their waste management practices in general.

Actions Required

In some instances, action might be dictated by legislation or regulatory action to protect human health and the environment. Examples include landfill bans and limitations on the use of certain raw materials (e.g., mercury). Beyond that, the means of resource recovery and waste disposal should be dictated, whenever possible, by an objective look at true social and economic costs. No one method is necessarily favored over another. Also, where there exists a need for uniform statewide policies and procedures, the methods of management should be established by the legislature and appropriate agencies, such as the Department of Natural Resources. Otherwise, policies should be set and enforced by responsible units of government at the local level.

Concluding Remarks

One final observation. These recommendations address a wide variety of seemingly disparate topics. This merely reflects the fact that our assignment touched upon a wide variety of conduct and circumstances, ranging from product creation to use, recovery and disposal. Taken as a whole, however, these recommendations knit together the steps necessary to have an integrated materials management system - a system where producers, consumers and waste handlers anticipate the conduct of one another and act in concert to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment.

Many changes are fraught with political challenges, but the recommendations in this report ignore political boundaries and reflect the strong views of members with disparate interests and points of view. Given this diversity of interest, the value of consensus is significant, and the Task Force voted unanimously to make the recommendations set forth in this report. These recommendations are deemed by the Task Force to be in the best interests

of Wisconsin in general, and its natural resources and residents in particular.

The Task Force believes that the implementation of these recommendations as a package would establish a comprehensive strategy for waste minimization, recovery, and disposal in Wisconsin. These recommendations are offered to achieve the vision for Wisconsin set forth by the Task Force and with the recognition that the preferred approach calls upon the creative minds of those with diverse views to balance competing

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interests while moving forward towards a sustainable waste management system in the best interests of Wisconsin, its people and its natural resources. Now is the time for change. Members of the Task Force stand ready to assist the Governor and policymakers as necessary to help implement these recommendations.

Respectfully submitted this 28th day of December 2006, by the members of the Governor's Task Force on Waste Materials Recovery and Disposal.

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Introduction

Waste is a fact of life. Materials that are not fully consumed or reclaimed are generally discarded. As a result, our natural resources are strained in at least two significant respects. First, resources used to produce goods and services are not being consumed efficiently. Second, natural resources are impacted by the management of waste, whether by composting, recycling, incineration, or landfilling. Landfills are developed, for example, and the corresponding use of land is permanently altered. Air emissions occur as waste is composted, incinerated or left to decompose in a landfill. Local water resources might be affected. The more waste, the greater the impact, and these impacts can last over long periods of time to the detriment of future generations both environmentally and economically.

If waste generation can be minimized — or even prevented — we can reduce the strain on natural resources. Indeed, the prudent use and preservation of natural resources are the hallmarks of environmental stewardship. While we recognize that waste is a current fact of life, or at least life as we have come to know it, there may come a point in time when the amount of waste generated, or the rate of waste disposal itself, is simply too great to be supported by society over the long haul from an economic and environmental perspective. After all, the current model, to the extent it involves the consumption of natural resources to make products that are used and discarded, does not mimic natural systems where waste is recycled and its components are reused in future cycles of production again and again.

There are competing interests, to be sure. The compatibility of economic development with environmental preservation is one example. But whether or not you believe that responsible environmental stewardship is inherently a good thing, if not a social and moral obligation, a compelling case can be



Construction workers recycle metal on a job site. Photo courtesy WasteCap Wisconsin.

made for improvements in our current approach to waste prevention, reduction, recovery, and disposal.

There are many reasons for change, but several are immediately apparent. First, the current approach to solid waste management in Wisconsin all too often focuses on narrowly defined (and short-term) financial costs. By contrast, shouldn't we understand the true social, economic, and environmental impact of waste management alternatives? Whether we decide to change our ways or not, shouldn't we at least be "informed" before we make decisions — through action or inaction — that may impact the environment or threaten the well-being of some or all state residents? The need to establish sound public policy calls for nothing less than an honest, open, and complete understanding of all "costs."

Second, much of what is “thrown away” each year has genuine value. These resources should not be “thrown away” without a concerted effort to prevent waste and promote effective recovery for further productive use. Moreover, proper management and recovery of these same resources could mean sustained and perhaps even more jobs for Wisconsin.

Third, the price of landfill disposal — often described as a “tipping fee” — is only part of the equation reflecting the cost and value to society of product creation and disposal. In at least some cases, the “true” cost of creating a product is not borne by the manufacturer, but by the entity required to deal with its disposal. This may result in additional costs to Wisconsin consumers and communities, including both current and future generations, or it may place a significant burden on municipal and private resources responsible for waste recycling and disposal. A fair assessment of the “true” environmental cost of product creation, consumption, and disposal — cradle to grave — is necessary to assure that those who benefit from the manufacture, sale or purchase of a product share in the cost and

consequences of disposal.

The need for proactive management of issues relating to waste management is readily apparent in the world about us. Whether it’s enhanced product stewardship in the European Union or e-waste regulation in California, society as a whole perceives the

A compelling case can be made for dramatic changes in our current approach to waste prevention, reduction, recovery and disposal.

need to confront these issues in a serious and responsible fashion. To ignore this trend, Wisconsin falls behind, and in the worst case becomes a dumping ground for others.

Active management of these same issues in Wisconsin could well delay a crisis, and in this case a crisis delayed could be a crisis avoided if the delay gives us time to strike the right balance between product stewardship, recycling and disposal practices.

In any event, these are not issues easily resolved, nor can one party lay claim to all the right answers. Indeed, the preferred approach calls upon the creative minds of those with diverse views to see if we can balance competing interests while moving forward towards a sustainable waste management system in the best interests of Wisconsin, its people and its natural resource.

2

Formation of the Task Force

A. The Genesis for a New Approach

Wisconsin has a strong tradition in progressive environmental management. Our landfill regulations have been a model for federal solid waste programs. Our recycling programs have achieved considerable success in diverting useful material from outright disposal. In addition, we have a strong program for the beneficial use of high-volume industrial byproducts.

Notwithstanding these successes, there are several troublesome trends. In absolute numbers, the volume of waste generated and disposed of in landfills has gradually increased. In 1995, municipal solid waste (MSW) discarded in Wisconsin was below 4 million tons. By 2004, as depicted in Figure 2.1 below, the total was closer to 7 million tons.¹ On a per capita basis, each resident in Wisconsin was discarding 1,313 pounds of MSW in 1995, a figure that rose to 1,782 pounds in 2004.²

Since 1995, residential recycling and composting rates have been fairly level. The volume of MSW diverted to recycling and composting has fluctuated between 1.34 and 1.49 million tons.³ The volume of MSW diverted from disposal, however, peaked in 1999 at 616.62 pounds per person per year and dropped to 621.50 pounds per person per year in 2004.⁴ (By contrast, EPA just released data for 2005 suggesting a slight increase in recycling rates on a national basis from 529.25 pounds per person per year in 2004 to 532.9 pounds per person per year in 2005.⁵)

Although the state diverts more than 40% of waste materials from traditional land disposal when you include tires and the on-site management of yard waste, significant amounts of recyclable or re-

¹ See Table 1 in Appendix B.

² Id.

³ See Table 2 in Appendix B.

⁴ Id.

⁵ See *Municipal Solid Waste in the United States: 2005 Facts and Figures* (October 18, 2006), <http://epa.gov/msw/msw99.htm>

In this section

- A** The Genesis for a New Approach
- B** The Enabling Executive Order
- C** Membership and Administrative Support

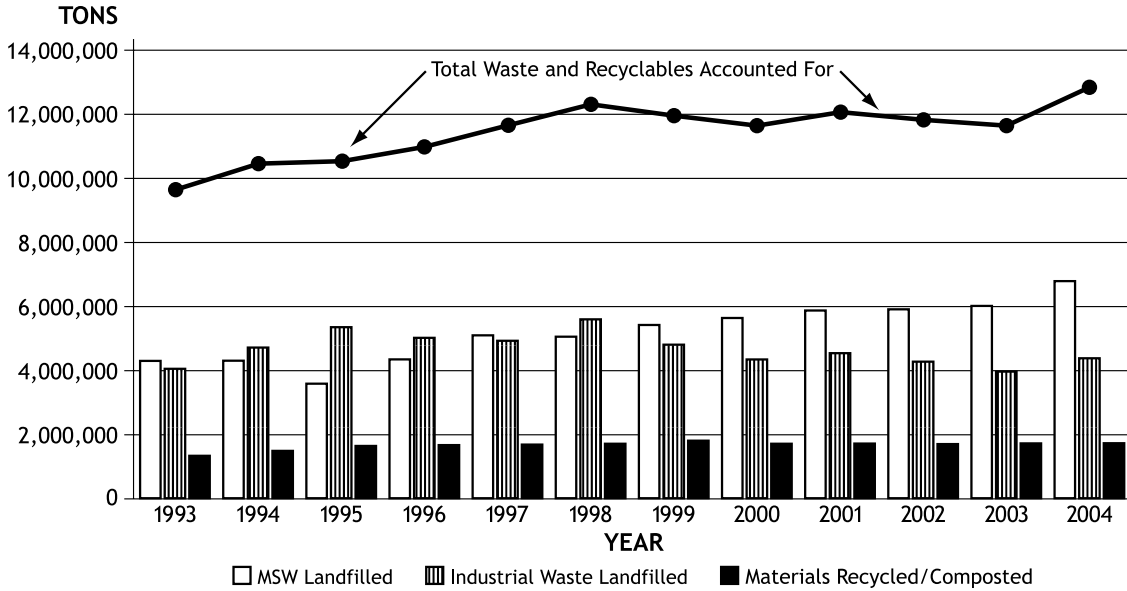
usable materials could still be recovered for further use. Indeed, there is significant variation in the recycling rates for materials banned from Wisconsin landfills (see Table 2.1 below). The general composition of MSW is shown in Figure 2.2 below.

Other trends are apparent. Wisconsin historically has experienced low recycling rates in the commercial business sector. The nature of the waste stream itself has become more complex and, in some instances, more toxic as reflected by certain components in waste electronic products. Other waste streams resulting from a change in lifestyle practices have developed in the past several years, such as the emergence of bottled water and new consumer packaging trends. At the same time, financial resources for maintaining current public programs to address existing waste issues, much less developing new ones, are scarce. Money earmarked to support local initiatives, for example, has been diverted to other uses deemed by some to reflect priorities greater than waste management and recycling programs.

The net effect is quite straightforward. The volume of wastes generated and discarded is increasing. Our early success is being diminished by the introduction of new products that are both more numerous and challenging to recover and recycle.

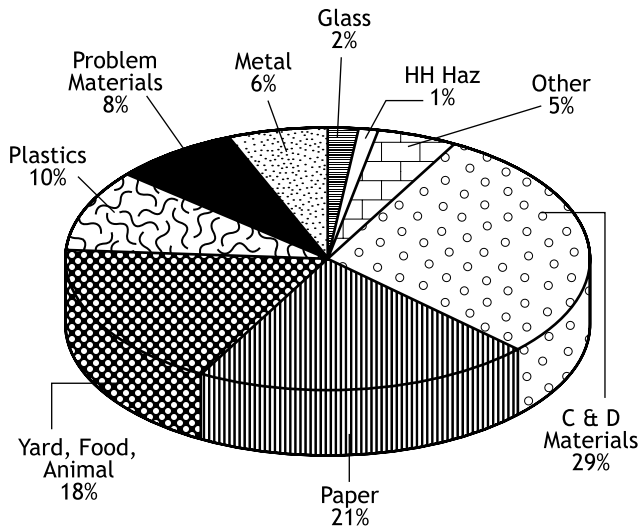
In this setting, the Wisconsin Department of Natural Resources recommended to Governor Doyle the formation of a Blue Ribbon Task Force. DNR felt that the state, as a community, needed to be involved in the assessment of these trends and the development of constructive measures designed to improve waste

Figure 2.1: Disposal and recovery of waste in Wisconsin, by year



Source: Compiled by DNR staff from annual landfill tonnage figures and related reports. Includes waste originating out of state but excludes material sent to waste-to-energy incinerators (except residue sent to landfills) and waste sent out of state for disposal.

Figure 2.2: Waste composition by major material category



Source: Wisconsin Statewide Waste Characterization Study (May 2003).

Notes: "C&D Materials" include wood, concrete, drywall and other construction & demolition debris. "HH Haz" includes paint, pesticides and other household hazardous wastes. "Paper" includes all types of paper. "Problem Materials" include electronics, appliances, fluorescent bulbs and batteries.

management and recycling programs in Wisconsin.

The concept of a Blue Ribbon Task Force resonated with Governor Doyle, particularly in light of his environmental and conservation agenda known as Conserve Wisconsin. Therefore, on Earth Day, April 22, 2005, Governor Doyle announced his intent to appoint the Task Force.

B. The Enabling Executive Order

The Task Force was authorized pursuant to Executive Order #106 (June 14, 2005), which can be found in Appendix A. The Order was based upon the following key observations:

- Wisconsin citizens, businesses, and municipalities depend upon proper management of waste to protect human health and the environment, to ensure continued economic development, and to promote the welfare of future generations.
- Existing solid waste policy acknowledges that "maximum solid waste reduction, reuse, recycling, composting and resource recovery is

in the best interest of the state in order to protect public health, to protect the quality of the natural environment and to conserve resources and energy.”⁶

- The failure to maximize the productive use of waste materials represents an inefficient use of society’s resources and leads to increased economic and environmental costs affecting all citizens of the state.
- Wisconsin has a proud tradition as a national leader in the recovery of high-volume industrial byproducts, recycled consumer waste, composting yard waste, and the development of solid waste management standards.
- Wisconsin faces a challenge to improve on its successful recycling and waste management record, including an effective response to new waste streams and changes in consumption habits.
- Landfilling solid waste as practiced in Wisconsin and the rest of the nation poses potential burdens to future generations.
- Wise land use principles require Wisconsin to achieve a reasonable balance between waste generation and disposal requirements and the development of disposal capacity.

With these observations in mind, the Task Force was given the following mission:

- To study and make recommendations regarding the economics of landfilling and recycling solid wastes, including the full environmental costs and benefits, and the extent to which those costs and benefits are reflected in the prices of landfilling and recycling and associated fees collected by the state.
- To review the extent to which materials with economic value are lost to landfilling and to recommend ways to maximize the productive use of waste materials, including materials recycling and composting.

⁶ Section 287.05(1), Wis. Stats.

Table 2.1: Recycling rates for materials banned from WI landfills

1991 bans	% recycled
Lead acid batteries	> 95%
Major appliances	> 95%
Waste oil	no data
1993 bans	% recycled
Yard waste	78%
1995 bans	% recycled
Newspaper	67%
Corrugated cardboard	72%
Magazines	31-35%
Office paper	28-57%
Aluminum containers	55%
Steel containers	54%
Glass containers	57-74%
Plastic containers (#1&2)	41-51%
Tires	> 95%

Source: 2002 Waste Characterization Study

- To study and recommend ways that Wisconsin can minimize the generation of waste materials including, incentives for waste material reduction and reuse.
- To study the current management of toxic and nontoxic solid wastes and to recommend ways to ensure that these wastes are managed in a manner that minimizes present environmental impacts and potential burdens to future generations.
- To consider the role of Wisconsin municipalities, businesses and residents in the use, management and disposal of waste materials.

This Report reflects the conclusions and recommendations of the Task Force in addressing the mission established by Governor Doyle.

C. Membership and Administrative Support

Membership on the Task Force was drawn from a broad cross section of stakeholders, including mu-

Table 2.2: Members of the Governor's Task Force on Waste Materials Recovery and Disposal

Richard Bishop (Workgroup Chair)
University of Wisconsin - Madison

Brian Borofka
Wisconsin Energy Corporation

Preston Cole
City of Milwaukee, DPW

George Dreckmann (8/05 - 8/06)
Madison Recycling Coordinator

Franklyn Ericson
SC Johnson

Loreen Ferguson
SCA Tissue North America

Jeffrey Fielkow
WM Recycle America

Paul Jenks (8/05 - 4/06)
Veolia ES Solid Waste, Inc.

Meleesa Johnson
Portage County Solid Waste Dept.

Brian Jongetjes
Johns Disposal Service, Inc.

Jennifer Kunde (Workgroup Chair)
WasteCap Wisconsin, Inc.

Charles Larscheid (Workgroup Chair)
Brown County Port and SW Dept.

Michael Michels (Workgroup Chair)
Cornerstone Environmental Group, LLC

Lynn Morgan
Broydrick & Associates

Sonya Newenhouse
Madison Environmental Group

John Reindl
Dane County Public Works

Keith Reopelle
Clean Wisconsin

Michael Slattery (5/06 - 12/06)
Veolia ES Solid Waste, Inc.

Brian Tippetts (4/06 - 12/06)
La Crosse County

Arthur A. Vogel, Jr. (Task Force Chair)
Quarles & Brady LLP

Gary Zajicek
Veridian Homes

municipal representatives, waste service companies (transportation, disposal, and recycling), environmental interest groups, and the Wisconsin business community. Members are listed in Table 2.2.

Although an independent body appointed by Governor Doyle, the Task Force was ably assisted by representatives of Wisconsin's DNR and others. Indeed, the Task Force collectively expresses its appreciation for the interest, hard work, and resources provided by the following:

Scott Hassett

Secretary, Department of Natural Resources

Al Shea

Administrator, Division of Air & Waste

Suzanne Bangert

Director, Bureau of Waste & Materials Management

Cynthia G. Moore

Recycling Program Coordinator

Brad Wolbert

Hydrogeologist

Mike Degen

Special Assignment, Waste Program

The Task Force further appreciates the help and assistance of Dan Fields (DNR), Larry Lynch (DNR), Jane Washburn (DNR), Vera Swanson (DNR), Sarah Murray (DNR), Karen Ecklund (DNR), Joe Van Rossum (UW-Extension) and Dave Anderson (SCA Tissue, North America).

A detailed summary of the manner and timing by which the Task Force organized itself and conducted its business can be found in Appendix C.

3

Observations of the Task Force

In the course of its deliberations, the Task Force recognized a number of circumstances or practices that tend to impact the generation and management of solid waste. These “observations” provide useful background, and they help to demonstrate just how complicated the issues can be.

First, a brief lexicon of common terms, but terms holding a particular meaning when used in the report.

“Waste” means a product or material no longer suitable or wanted for its intended purpose, or what’s left over and unwanted after a product has been used or consumed. Waste is generally reused, recycled, composted, incinerated or buried in a landfill.

“Minimize” means to achieve as much reduction in generation, usage or disposal as possible given corresponding economic and regulatory feasibility.

“Maximize” means to achieve as much of an increase in usage or generation as possible given corresponding economic and regulatory feasibility.

“Producer” means the entity or individual that manufactures or creates a product for sale or use by others. Producers can generate waste in the process of manufacturing products. They can also affect the quantity and quality of the solid waste stream, as product packaging materials are discarded and products themselves are used up and discarded. Such products may contain more or less toxic materials and recyclable components depending on decisions made at the time of manufacture.

“Consumer” means the entity or individual that purchases a product, uses it, and creates a waste when the product is no longer suitable or wanted for its intended purpose. Consumers may be house-

In this section

- A** Waste as a Resource
- B** Solid Waste Hierarchy
- C** Marketplace Realities
- D** Product Manufacturing and Distribution Processes
- E** Economic Impacts
- F** Volume Versus Toxicity
- G** Practical Considerations
- H** Governmental Institutions and Regulatory Management

holds, businesses, and institutions such as government agencies, colleges and universities, jails and prisons, and hospitals.

A. Waste as a Resource

This is a report by a Task Force charged with addressing “waste” issues, and the word “waste” appears frequently in the text. The Task Force recognizes, however, as must Wisconsin’s residents and business leaders, that “waste” discarded instead of recycled or recovered is generally a resource lost. While landfills play a valuable and necessary role in the waste management system, the value of material placed in a landfill is greatly reduced except for energy that may be recovered by capturing gases. Every product or package we landfill represents manufacturing production (including raw materials and energy) that is effectively lost. The current solid waste system must evolve from one designed for disposal to one optimized for recovery and reuse. Better still,

we should, where we reasonably can, prevent the waste from being generated in the first place.

B. Solid Waste Hierarchy

Wisconsin has a long-standing policy for solid waste reduction, reuse, recycling, composting, and resource recovery. It holds that the

*“maximum solid waste reduction, reuse, recycling, composting, and resource recovery is in the best interest of the state in order to protect public health, to protect the quality of the natural environment and to conserve resources and energy.”*¹

There has been little basis to quarrel with this finding. But today, it may have lost some of its economic relevance. With escalating energy prices, perhaps a new paradigm is required. After all, a lot has changed including not only the price of energy but the overall marketplace of products, the nature of waste (at least in some instances), and the impacts caused by a growing population. The trick is to establish a policy that is environmentally and economically sound and then to find new and more effective ways to achieve this basic policy.

In the current law, the state encourages the following priorities “whenever possible and practical”:

- (a) The reduction of the amount of solid waste generated.
- (b) The reuse of solid waste.
- (c) The recycling of solid waste.
- (d) The composting of solid waste.
- (e) The recovery of energy from solid waste.
- (f) The land disposal of solid waste.
- (g) The burning of solid waste without energy recovery.²

¹ Section 287.05(1), Wis. Stats. (emphasis added).

² Section 287.05(12), Wis. Stats.

The Legislature recognized that implementation requires:

... the involvement and cooperation of all persons and entities comprising this state’s society, including individuals, state and local governments, schools, private organizations and businesses. To achieve this involvement and cooperation, state government should rely to the maximum extent feasible on technical and financial assistance, education and managerial practices to implement these policies. Necessary regulations should be developed with maximum flexibility.³

This policy was first enacted in 1983, with modifications in 1989 and 1995. Except where otherwise required, this policy is indeed only a policy. It does not require that materials be handled by the higher priorities, nor that state regulations prohibit or inhibit the development of facilities near the bottom of the hierarchy.

State agencies, local governments, businesses and citizens have responded to this hierarchy in many ways. With recycling and composting higher on the hierarchy than landfilling, mandatory recycling laws were adopted in Wisconsin. The Department of Natural Resources (DNR) has developed a competent staff for many aspects of recycling, and has developed programs for education, technical and financial assistance for not only household materials, but also for a variety of other materials, such as high volume industrial wastes and drywall. The DNR and other state agencies — such as the Department of Transportation and the University of Wisconsin — have sponsored or conducted research into expanding markets for recoverable material and for making recycling more efficient. The DNR has also reduced or eliminated project review fees or permits for beneficial use projects.

³ Section 287.05(5), Wis. Stats.

Even so, all parts of the hierarchy have not been adopted equally well, and some requirements have had only limited implementation. The top priority in the solid waste hierarchy, for example, is waste minimization or waste reduction. The DNR has been working with industry on pollution prevention/waste reduction for many years. Several cooperative environmental agreements (the predecessor to “Green Tier”) have focused on waste reduction or minimization. But these efforts have been less publicized and tend to target specific issues or companies without as much promotion as recycling to entities like local government, the business sector, or citizens of the state in general.

Other examples of action or inaction can be cited. In the end, however, although the hierarchy has been part of state solid waste policy for more than 20 years, it has not been implemented in a way that, in the Task Force’s view, will meet the needs of Wisconsin in the coming years.

C. Marketplace Realities

New challenges abound. The industrialized world has produced greater wealth, more products, and greater choices than at any time in history. At the very least, access to products has grown by leaps and bounds. In the United States, there is a strong trend towards “convenience,” which often manifests itself in the disposable nature of consumer products. Using disposable diapers instead of laundered cloth diapers is the classic example, but there are many others (returnable bottles replaced by cardboard or glass, metal or plastic throw-aways, paper napkins and plates, and so forth). The net effect, of course, is growing amounts of solid waste for disposal — even if recycling rates increase. The amount of waste earmarked for disposal is even greater if recycling rates plateau or drop off.

The dynamics are even more complex. Emphasis on low cost products makes it easier, in many cases, to discard a broken product and buy a new

one than to fix the broken product in the first place. This has led to the regulatory irony that an empty can of soda can’t be sent to a landfill, but a broken toaster or child’s bike can. Why pay \$60 to fix the toaster when you can get a new one for \$40 at the local store? The broken toaster goes out with the trash. These are simplistic examples, but instructive nevertheless.

Even as the volume of waste increases, competition for the useful component of solid waste, at least in some cases, grows as well. Wisconsin’s long-admired paper industry, for example, still contains a number of “recycle” mills — mills that depend on waste paper as a raw material in the production of tissue and other grades of paper. Typically, Wisconsin ranks as the number one or number two consumer of scrap paper for recycling among all states. These mills find themselves competing in a global market for waste paper, especially as demand in the Far East grows for the very same materials to support a burgeoning population and economics enjoying the fruits of rapid economic growth.

It is increasingly apparent that local conduct impacts others, including those far beyond the borders of Wisconsin. Greenhouse gases generated in Wisconsin, for example, impact the global environment. Waste electronics generated in Wisconsin sometimes find their way to Third World nations where environmental safeguards for recycling and disposal are far less stringent or even non-existent. Similarly, conduct beyond Wisconsin’s borders can have an impact on us through the flow of interstate waste to Wisconsin landfills, incinerators and recycling centers, or restrictions on the manufacture of Wisconsin products that will be consumed in states like California with significant product disclosure and recycling requirements.

These types of realities must be accounted for as we develop sound policies for solid waste management in Wisconsin.

D. Product Manufacturing and Distribution Processes

Many current manufacturing processes focus on product innovation, the low cost of raw materials, ease of assembly, and rapid entry to the market. Manufacturing and distribution processes operate in one direction, transforming raw materials and energy into a quickly and “efficiently” produced item that is targeted for the end consumer. Although there are exceptions, including some forward-looking Wisconsin firms, most companies do not consider the final disposition of either the product or its packaging.

With traditionally low costs for virgin raw materials, there has been no widespread manufacturing demand for materials that have been recycled. Conversely, with a fluctuating rate of consumer and business recycling, it becomes more difficult to supply recovered materials to manufacturers on a reliable basis and at rates competitive to virgin resources. In short, there is not enough movement of materials from the current consumer back to the manufacturer, although this might change to some extent as energy costs increase.

Action by Wisconsin businesses and consumers to promote a more circular approach from raw materials to product back to raw materials in other products (rather than a linear movement towards waste and disposal) could result in benefits both within the state and in Wisconsin’s competitiveness in a world market. The increasing volatility of energy and raw material prices will eventually require attention and force this change anyway. Leveraging the state’s manufacturing experience in combination with research and development by the university and technical college system could accelerate this movement.

E. Economic Impacts

It is increasingly important to understand the “true cost” of waste management decision-making. One

cannot rely on simple comparisons to assess complex economics. A \$30 per ton landfill tipping fee, for example, in all likelihood cannot be compared to, say, a \$45 unit cost for recycling by a particular municipality. One has to determine whether they both account for necessary expenses like collection and transportation and whether the recycling “cost” includes the offsetting value of materials sold. In addition, are environmental impacts - both current and long-term - included? In such cases, there have to be an apples-to-apples comparison to evaluate the cost of various waste management options.

In addition, input variables change rapidly. One much-discussed example is the cost of energy. What is the distance to different waste management alternatives, such as the landfill or recycling center? The cost of transportation could go up dramatically for one and not the other, maybe enough to shift the balance, making what was previously the less-expensive alternative more expensive in the long run.

The Task Force also recognizes that market pressures in some instances likely promote waste minimization. A company that can reduce the amount of cardboard, paper, metal or plastic in product packaging, for example, is likely to do so on its own simply to reap the benefit of lower costs. Even so, this may not be enough when massive amounts of packaging are required for product safety or protection in transit. It may not get at the root of certain disposal conundrums, like reducing or eliminating the portion of toxic materials or components in products that are likely to end up in the solid waste stream.

F. Volume Versus Toxicity

Environmental impacts can be driven by emissions from the disposition of materials (recycling/composting, incineration or disposal) or by changes in impacts associated with raw material extraction and product manufacturing reduced by enhanced recy-

cling. These impacts relate to the volume or toxicity of the product in question. The highly toxic component of municipal solid waste is a very small percentage of the total waste volume, but it has a large environmental impact relative to the more benign components of solid waste. To reduce toxicity, attention must focus on a relatively small portion of the overall waste stream.

By the same token, we have already seen how targeting high volume components can have a dramatic effect on the amount of waste placed in landfills and their impact on the environment. Beginning on January 3, 1993, for example, yard waste was banned from landfills. Since the ban took effect, almost all yard waste generated in Wisconsin is either managed on site (i.e., with home mulching mowers) or through composting, and active markets have developed for use of the composed material. Waste types that are a significant percentage of the overall waste stream, like construction and demolition debris (28.7%) or waste paper (20.8%), seem ripe for attention as opportunities, with creative management, to reduce dependence on disposal.

G. Practical Considerations

We live in a culture of consumerism. We buy stuff. And eventually we get rid of it. Wisconsin is not alone, as the United States is a consumer-based culture. Any recommendation by the Task Force must recognize that there is a collective desire by Wisconsin residents to have easy access to the most current consumer products, the most convenient service, safely packaged foods, and all at the lowest guaranteed price. Attempting to interrupt this consumer model with requirements for recycling, product take-back or deposits may be met with skepticism, if not electorate resistance.

Personal habits are hard to change. We all have habits. Some are born of ignorance. (“I wouldn’t have thrown that away if I had known there was some value to it.”) Some flourish through lack of

cares. (“Once it’s in my trash, it’s out of sight and out of mind.”) Some prevail by personal choice. (“This is America. If I want to throw it away, I can throw it away.”) At the very least, there is resistance to change. People by and large don’t like to be told what to do. Notwithstanding this phenomenon, certain trends may be changing the paradigm (“Daddy, today in school the teacher told us we should recycle our newspaper. Can you help me do that?”). In any event, the State can legislate conduct where it is deemed to be in the public interest.

Reasonable legislation is likely to change conduct. If there were no restrictions on landfill disposal in Wisconsin, some percentage of state residents — based on personal beliefs — would still recycle and reduce waste generation in the first place. Similarly, if we were to adapt the most stringent waste laws in the country, designed virtually to eliminate landfills, some state residents would continue to throw away waste with impunity. It is very likely, however, that the vast majority of state residents - given a clear understanding of the need - would respond in some fashion to new initiatives designed to reduce waste and promote recycling if those initiatives are reasonable in the first place and reasonably tied to objectives that can be explained and understood by the consuming public. Our objective should be to promote measures that will be embraced by the majority, not to hope that we can make significant progress with the small minority who are unlikely to change in the first place.

Education/advertising is critical. Habits don’t change overnight. Objectives and methods critical to effective waste management must be effectively conveyed to the public. Wisconsin has long known this, as reflected in another aspect of its solid waste policy. “[S]tate government should rely to the maximum extent feasible on technical and financial assistance, *education* and managerial prac-

tices to implement these policies.”⁴ Nothing has changed in this regard.

People respond to economic incentives. Incentive based mechanisms can be used to help encourage waste reduction, recycling, and other behaviors. Example are charges per bag of trash, deposit-refund systems for beverage containers, and systems that provide financial rewards or discounted goods to encourage recycling. Although perhaps controversial, they remain an option.

Funding must be available. It may not be practical to expect support for waste reduction and management practices from general tax revenues, but what is collected from waste-related activities (e.g., state tipping fees, vehicle title transfer surcharges for tire disposal) must be preserved for its intended use. It must be distributed effectively to programs that develop and support sound pollution prevention and solid waste practices. When it is deemed to be in the public interest, waste-related fees ought to be increased to finance new waste management initiatives.

These are complex issues. One course of action, although well intended, may have consequences beyond the initial objective. Adding to the list of banned substances from landfills, for example, requires consideration of things like the potential for illicit disposal, mechanisms for effective enforcement, support for local units of government to deal with the collection of banned waste, and markets for reclaiming or properly disposing of such waste. As much as possible, these additional consequences should be anticipated and considered before action is taken.

There is no “perfect” approach. The state should not look for the “perfect” waste management pro-

ocol. “Perfection” is not the goal here for at least three good reasons. First, a debate on “perfection” will be a significant distraction. What is “perfect” for one part of the community will not be “perfect” for another. Second, significant, beneficial progress can be made without deciding on perfection. Our objective is to move the state forward in constructive ways, ways that help us better manage resources, not to promote debate over perfection. Third, what may seem “perfect” today may not even be relevant 10 or 20 years from now. The marketplace, political realities, economic/social pressures, and new information on social and environmental impacts are very likely to change in the coming years in ways that may very well change our overall objectives for waste management.

H. Governmental Institutions and Regulatory Management

The importance of a coordinated regulatory approach is also recognized in our current waste management policy. Efforts to fulfill state objectives “should be planned and coordinated in order to maximize beneficial results while minimizing duplication and inefficiency.”⁵

This has ramifications both in-state and out-of-state. First, we must promote cooperation on an intra-state basis. We should pursue cooperation in a general regulatory context to assure a broad-based, consistent, and effective approach to the regulation of waste. We must find ways to promote local and regional cooperation to avoid duplication of effort and increase economic efficiency. It is a challenge, for example, for the nearly 1,100 Responsible Units (RUs) in Wisconsin to both keep up with changes in the marketplace and new technology, as well as to form cooperative systems that provide economies of scale.

This might be difficult. For lots of reasons, most local governments take their responsibility

⁴ Section 287.05(5), Wis Stats. (emphasis added).

⁵ Section 287.05(6), Wis. Stats.

for waste management seriously. This is surely motivated by public health, liability, economic, and environmental concerns. Some may reflect a more parochial interest in maintaining control, or it may simply reflect a lack of trust in other public or private bodies. In any case, local government's role must be recognized, understood and addressed as improvements are proposed. Special attention may be required to promote a cooperative and joint approach to these decisions where it makes economic sense.

In addition, recognizing that waste prevention is inexorably tied at some level to the manufacturing process, we should cooperate with adjoining states to assure consistency in regulation. This will likewise create a louder and more compelling voice when calling for greater product stewardship at the manufacturing level.

As for regulation itself, there is likely a need for action. Education and volunteerism may advance the ball somewhat, but regulatory reform is

required to alter behavior and to promote conduct that is compatible with waste management objectives. It cannot, however, be used to "pass the buck." It should not create "unfunded mandates" as, for example, banning a particular waste stream from disposal, but then leaving it to other governmental units to incur the cost — and to deal with the headaches — of managing the banned material. To the contrary, regulations should look at the broader picture. If the objective is to encourage more recycling, a mechanism for developing markets for reuse, or a requirement to phase out the hazardous components of that product, should be considered at the same time.

We must also guard against the regulatory phenomenon of pushing the environmental problem to another medium, following the path of least resistance. In addressing the solid waste issue, we need to have assurances that we are not creating an air or water quality or other environmental issue that must be addressed at some point in the future.

4

Out-of-state Waste Issues

As the Task Force began its work, solid waste imported from other states was much in the news. In the course of hearings held by the Task Force to solicit comments on matters of interest to the public, a number of speakers raised concerns - and generally spoke in opposition to the importation of waste from out of state.

The Task Force discussed at length issues associated with the flow of solid waste across state lines, along with a comprehensive slate of general solid waste issues. The flow of waste is often independent of state and local geopolitical boundaries, and the reasons for such movements are diverse. It has been duly noted by the Task Force that, over several decades, state and local governments have expended substantial time and money attempting to artificially restrict the flow of solid waste commerce across such geopolitical lines.

Indeed it is interesting to note that on the one hand, some of these initiatives have sought to prevent the exportation of waste (e.g., flow control to force local waste to a particular management option), while others have sought to limit - if not prevent - the importation of waste altogether (e.g., the imposition of solid waste or recycling standards on exporting states and differential taxation initiatives aimed at raising the cost of importation). In most cases such initiatives have resulted in long and costly litigation.

The cases involving various state and local legislation restricting the flow of interstate waste, and the federal constitutional limitations on such actions, indicate that the relevant legal issues are complex and continue to evolve. The validity of interstate waste bans, taxes and fees aimed at restricting the flow of waste across state lines are subject to judicial scrutiny. These taxation issues include situations where taxes are imposed on out-of-state waste alone, or higher taxes are imposed on incoming

waste, or where taxes are imposed apparently evenhandedly, but the entire tax is rebated into local programs to the exclusion of out-of-state beneficiaries. In addition, since such taxes must be evenhanded, the negative economic and political impacts of such taxes must be considered. Thus the fiscal and political impact of taxes that may be imposed on in-state residential, commercial, industrial and municipal generators of waste may materially outweigh the potential perceived benefit of slowing the importation of out-of-state waste.

In view of the complexity of such legal and fiscal impact issues, the Task Force has determined that initiatives or policy recommendations designed simply to reduce or ban the importation of out-of-state waste are beyond its primary mission.

Instead, the Task Force has focused its attention on some of the root concerns associated with land disposal of waste. These include such things as increasing waste volumes, the loss of resources otherwise suitable for recycling, materials too toxic for land disposal, and inequities in the landfill siting process. It has focused on overall legislative and regulatory policies designed to promote waste minimization and reclamation, while at the same time reducing the short and long term risks of continuing disposal. Such regulatory and legislative initiatives include the following:

- Universal Waste bans to reduce the toxicity of waste in landfills.
- Enhanced recovery initiatives for wood, paper, and construction & demolition (C&D) waste, which will reduce reliance on disposal for these waste streams.
- Providing for adequate financial assurance by landfill operators.
- Initiatives to promote producer responsibility for the fate of their products, which will reduce reliance on disposal of such things as

electronic wastes.

- Revisions to the landfill siting process.

The Task Force strongly believes that the initiatives it recommends will raise environmental standards and allow Wisconsin to move to the forefront in the protection of human health and the environment — regardless of the origin of the waste in question.

When the Task Force first convened, individual members immediately had ideas for “improvements” to the existing framework for solid waste management. As deliberations continued, however, there was a growing sense that these “improvements” were intended only to address specific problems without necessarily moving the state towards fulfillment of clear objectives for solid waste management in the future. In other words, without a clear “vision” for state policy, individual recommendations may only be directed towards doing “less bad” in the current framework instead of doing “more good” in a new framework designed to protect the people and resources of Wisconsin in the future.

Since the Governor instructed the Task Force to generate a “comprehensive strategy” for dealing with waste generation, recovery and disposal issues, the need for a clear statement of goals — or vision — became apparent. In order to provide an overall context for its recommendations, therefore, the Task Force developed a statement of its vision for solid waste and resource management in the future.

Simply put, the objective is to move towards ecological and environmental sustainability through a series of complementary actions designed to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment, simultaneously working to minimize total financial, social and environmental costs. Our vision for Wisconsin, therefore, can be stated as follows:

In a manner designed to minimize environmental, economic, and social costs to the residents of Wisconsin and beyond, the State of Wisconsin shall achieve and maintain an integrated materials man-

agement system consisting of enhanced producer responsibility for products, effective resource recycling and recovery, and responsible waste disposal – all designed to promote ecological and environmental sustainability.

We can elaborate further by discussing the meaning of certain key phrases in the narrative above.

“In a manner designed to minimize environmental, economic, and social costs” means that policies, regulations, and corresponding activities should be developed and implemented first with a true understanding of environmental, economic, and social costs and second in a manner designed to minimize total costs.

“Integrated materials management system” means a system of policy and regulatory requirements designed to work together in a series of complementary actions to direct the conduct of producers, consumers, and waste handlers so that each one anticipates the conduct of the other and acts to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment.

“Enhanced producer responsibility for products” means that the fate of any given product after use is accounted for in product design, manufacturing, and distribution. Manufacturers are already responsible for environmental impacts associated with the production of their products. As things now stand, however, this responsibility typically ends once a product is sold. Enhanced product responsibility would require, first, that the amount of toxic and hazardous components be substantially

reduced if not eliminated. Second, manufacturers would design, manufacture and distribute products in a manner designed to promote reclamation and to minimize the need for disposal.

“Effective resource recycling and recovery” means the development and enforcement of effective programs to identify the useful components of solid waste, to sort and recover such resources, and to develop markets for recovered resources. An effective program for resource recycling and recovery is likely to require regional cooperation. Governmental units such as counties, large municipalities, or solid waste districts should identify needs and opportunities within their jurisdictions and develop recycling and recovery programs accordingly.

“Responsible waste disposal” means disposal only when necessary, and then in a manner designed to minimize environmental impacts. Landfills, for example, should be designed and operated to minimize the need for engineering controls after the landfill is closed. Air emissions should be effectively collected, treated, and – whenever possible – used for beneficial purposes. Similarly, incinerators should be designed and operated to minimize air emissions and impacts to surrounding neighborhoods.

“Ecological and environmental sustainability” means that we find ways to meet our resource and

energy needs today without compromising the ability of future generations to meet their needs as well.

In response to many of the observations made in Chapter 3 of this Report, the Task Force believes that major policy changes are required to make this vision a reality. Doing so, however, will allow the state to protect human health, conserve land and natural resources, promote a vibrant, growing economy where external costs and benefits are considered, recognize that waste is often a resource for further use, and prompt cultural changes needed to achieve an effective, integrated system of materials management. The vision cannot be achieved overnight. It cannot be achieved with just a few changes in the existing regulatory system. Indeed, it will take the collective wisdom and experience of elected officials, agency personnel, stakeholders and consumers to achieve this vision for the State of Wisconsin.

There is precedent in Wisconsin, however, to achieve a vision such as this creatively and forthrightly. The State Seal with the word “Forward” has been exemplified by Wisconsin’s historic leadership in environmental and consumer protection, strong infrastructure supporting economic development, and research and outreach by its education and Extension system. The Task Force hopes that its report is another step “forward” in the protection of the environmental and economic interests of Wisconsin.

6

From Vision to Recommendations

A. The Pathway

To understand how we can move from vision to reality - from theoretical goal to concrete recommendations designed to achieve that goal - it may be helpful to look at a series of simple flow diagrams reflecting the life cycle of products. What follows is a simplistic – but hopefully useful – tool for understanding how we can build an “integrated” materials management system.

Traditionally, products were created and sold by producers. Products were used and discarded by consumers. The resulting waste was managed by governmental units or private industry. This is reflected in Figure 6.1.

In each instance, the party associated for one segment was generally not concerned with the fate of material once it moved downstream one step to the right.

Beginning in the 1970s, as waste volumes increased and the long-term environmental effects of disposal became more apparent, an emphasis developed on recycling waste; that is, finding some other use for it instead of, or at least before, ultimate disposal. The paradigm began to change as shown in Figure 6.2.

As reflected by the thickness of the arrows, recycling rates were still relatively small in relation to traditional forms of disposal.

In Wisconsin, this trend achieved a real boost in the 1990s with legislation banning outright the landfill disposal of several waste materials and

In this section

A The Pathway

B Funding

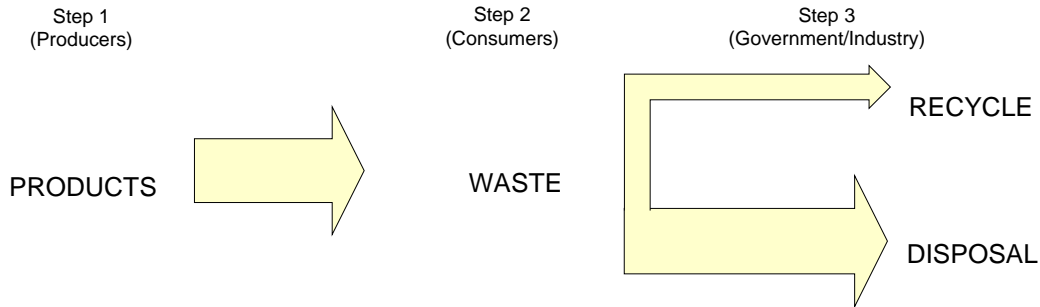
mandatory recycling laws at the local level for other materials. Even so, producers by and large were still not concerned with the fate of materials once they were passed on to consumers. The government, however, was looking upstream to the left, determined to reduce the amount of material subject to one means of disposal or another. Consumers, in turn, were beginning to pay attention to what happens one step downstream to the right. They began to modify their behavior, either because of personnel conviction or in response to new legal requirements associated with recycling. In addition, the waste-handling industry, whether run by government or private entity, began to recover energy from waste, either through landfill gas recovery or incineration.

To achieve the vision proposed by the Task Force, each player in the cycle must understand not only what happens downstream to the right, but what happens at each and every step both upstream and downstream. A producer, for example, should be thinking about ultimate recovery and disposal implications two steps to the right in the simple diagrams above. Consumers should be exercising

Figure 6.1: Material Flow Diagram Before Widespread Recycling



Figure 6.2: Material Flow Diagram With Some Recycling



choice by rewarding producers who create products minimizing waste and maximizing the opportunity for recovery. Also, consumers should play a significant role in directing waste towards reuse and recycling initiatives. The new paradigm, therefore, would look like Figure 6.3.

As reflected by the thickness of the arrows, less material (and less hazardous material) moves to the consumer in the first place and recycling takes a more prominent role in relation to traditional forms of disposal. This reflects a more sustainable cycle of resources and materials.

The merits of this new paradigm may be apparent, but how is conduct changed in away that moves us towards the vision established by the Task Force? The Task Force sought to acknowledge and, where appropriate, take advantage of the following forces:

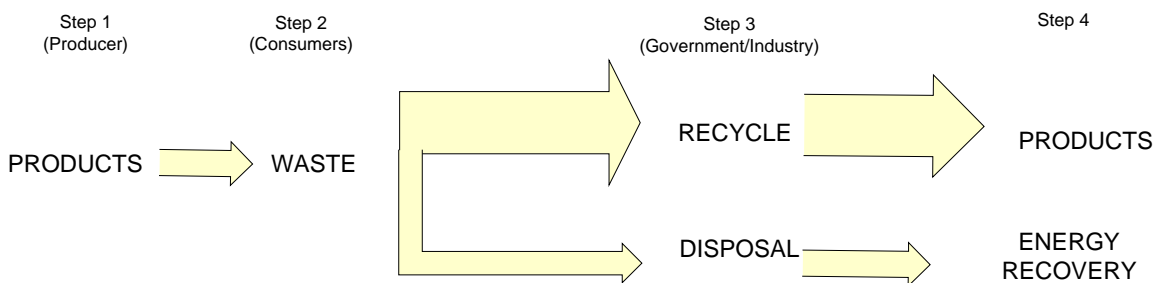
Market Forces

Certain market forces are moving us towards a more integrated system anyway. Producers reduce packaging, for example, or their reliance on more exotic and expensive components, not to reduce waste necessarily, but simply to reduce the cost of production. Producers are still driven by costs. Reducing costs can increase profits.

Good Will

Producers may perceive some competitive advantage by offering so-called “green” products. Certain consumer trends tend to favor products designed to promote recovery or to minimize environmental impacts upon disposal. Or, producers in certain industries manage their own “take-back” programs, which facilitate the recovery of certain problematic wastes as, for example, can be found in many electronic goods.

Figure 6.3: Material Flow Diagram With Enhanced Producer and Consumer Input



Legislation and Regulation

Where necessary, the government can step in to force conduct designed to make the whole system work better. This might include such things as bans on landfill disposal, recycling requirements, fees and grants, incentive-based mechanisms to encourage behavior that is consistent with public goals, and related initiatives.

The Task Force acknowledges the existence of market forces and good will in general but, recognizing that these tend to function on their own anyway, has focused on recommendations involving legislation, rule-making, and actions by stakeholders designed to contribute to an overall system for effective materials management. For each recommendation in Chapter 7 of the report, the Task Force identifies the entity that will likely be responsible for implementation of the corresponding recommendation.

Starting with the Vision Statement, and highlighting its key components, Task Force recommendations can generally be grouped according to each component of the Vision Statement. This is a useful way to appreciate how each recommendation contributes to the vision. Although the recommendations themselves are set forth in Chapter 7, they are summarized in Figure 6.4 in relation to each component of the Vision Statement.

Although there may be a lot of moving parts, the Task Force believes that this initiative, if implemented as a series of complementary actions, is the basic component of an integrated and improved materials management system for Wisconsin.

The Task Force has formed recommendations designed to address both high volume waste in general as well as low volume waste with high toxicity. They are designed to address environmental risks, to take advantage of opportunities for resource recovery, to alter waste management habits and practices, and to promote forward thinking about product stewardship and to foster waste management strategies based on the full social costs of the alternatives. Product stewardship is a key component of an effective strat-

egy. Reasonable steps must be taken to assure that products are manufactured with an eye towards reducing hazardous components, reducing total waste, and planning for proper management after their useful life, whether that is reuse, recycling or disposal. The long term goal is to encourage manufacturers and builders to incorporate life cycle costs into their decisions on product design, composition, distribution and recovery. Unfortunately, within the current framework it is often cheaper to discard than to disassemble or deconstruct products after their useful life.

B. Funding

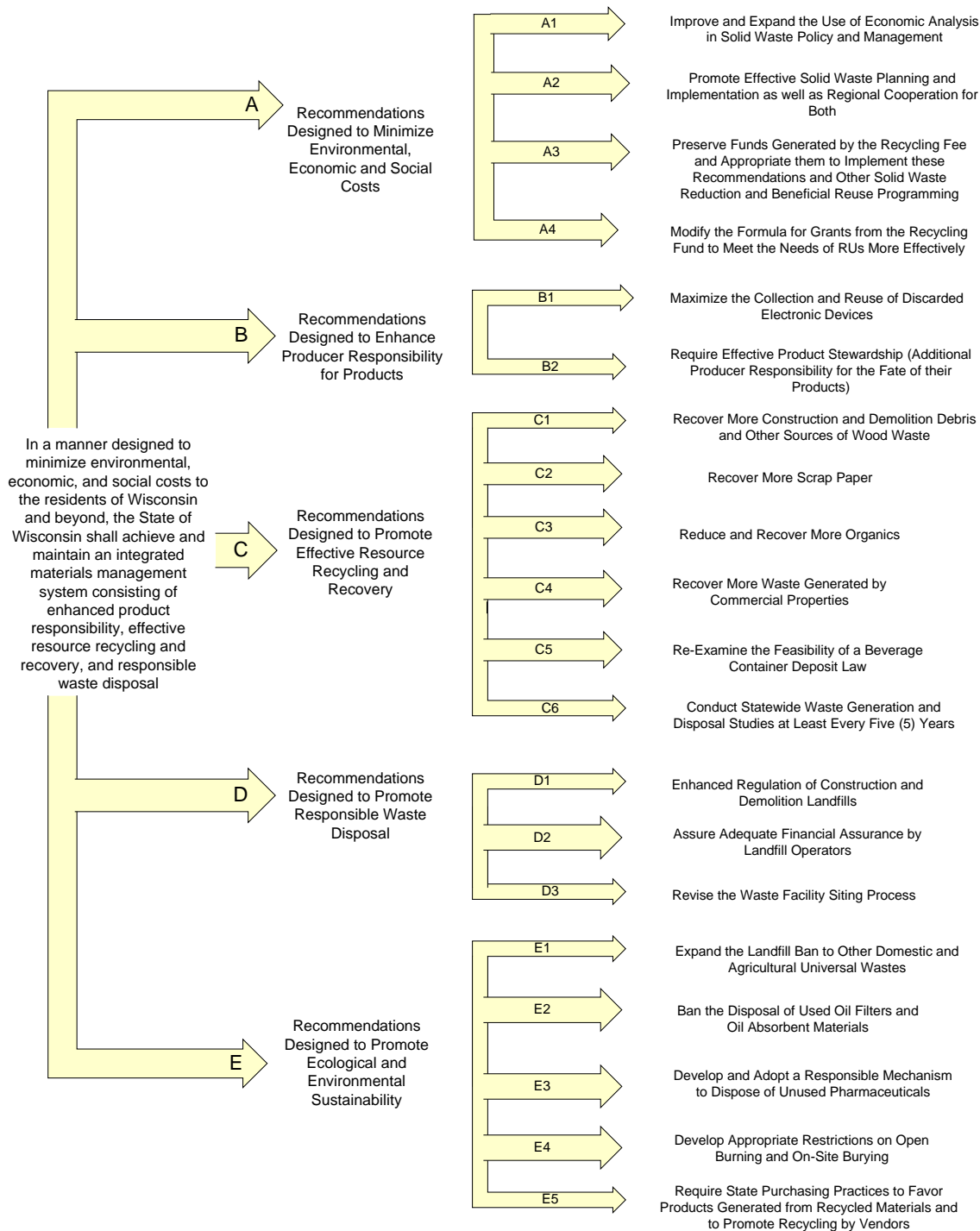
The issue of funding is a sensitive one. As noted previously, the Task Force is wary of unfunded mandates. In many respects, recommendations set forth in this report, to the extent they reorganize current programs, may not require net additional funding. Whenever possible, we encourage the Department of Natural Resources (DNR) to restructure current programs to accommodate the recommendations in this report without the need for additional funding. In addition, proposals relating to such topics as the management of discarded electronic devices, anticipate the payment of fees by manufacturers or, perhaps, deposits at the time products are purchased.

At the same time, the Task Force recognizes that the implementation of its recommendations as a comprehensive package will require additional funding. Although based on crude, order-of magnitude calculations, the level of funding required to implement the recommendations in this report is likely to range from \$6 million to \$10 million in the first year and up to \$5 million to \$7 million annually thereafter. The Task Force, composed as it is by members with diverse views on taxes, fees, and related matters, found it challenging to recommend a mechanism for funding the implementation of its recommendations. We have assumed that general purpose revenue is unlikely to be made available for waste management programs.

Most recycling and waste reduction programs

Figure 6.4: From Vision to Recommendations

From Vision to Recommendations



are funded through a non-lapsable trust fund created in 1989, which is commonly referred to as the “Recycling Fund.” The Recycling Fund receives revenue from a recycling surcharge (which, since 2000, comes mostly from a surcharge of 3% of gross tax liability for corporations) and a landfill tipping fee (which, since January 1, 2002, has been \$3 per ton).

The Recycling Fund, in turn, is used to support a variety of services, including administrative staffing, recycling demonstration grants, and grants to local units of government responsible for recycling programs (called “Responsible Units” or “RUs”). The general flow of revenue is summarized in Figure 6.5 below.

The dollar amounts in Figure 6.5 are estimates for 2005-06 as reported by the Wisconsin Legislative Fiscal Bureau and the DNR.¹

The results in figure 6.5 are fairly typical. They show an excess of revenue (roughly \$43.4 million) over expenses (roughly \$30.2 million) of approximately \$13 million. The figure varies with each budget cycle, but there has consistently been a surplus in this account. A pattern has developed by which significant portions of these unspent funds have been diverted to the general fund for budget balancing purposes. The amounts transferred in 2003-04, 2004-05 and 2005-06, for example, were roughly \$7.3 million, \$6.9 million and 22.4 million, respectively.²

Based on current projections, these funds, if retained for use on waste reduction and recycling initiatives as set forth in this report, would be adequate to implement and sustain Task Force recommendations in the coming years. Indeed, as set forth in Recommendation A3, the Task Force urges the Governor and Legislature to preserve these funds for use as intended on waste reduction and recycling initiatives in general and implementation of these recommendations in particular. Other revenue might also be generated by implementation of certain recommendations,

such as fees for recycling electronics (Recommendation B1) and extending the tipping fee to construction and demolition waste (Recommendation D1.2).

If Recommendation A3 is adopted, these recommendations as a whole can be implemented without the need for additional taxes or surcharges. The Task Force believes that this is a significant factor and one that supports the implementation of these recommendations as soon as possible. This will accelerate efforts to achieve a fully integrated solid waste management program in Wisconsin.

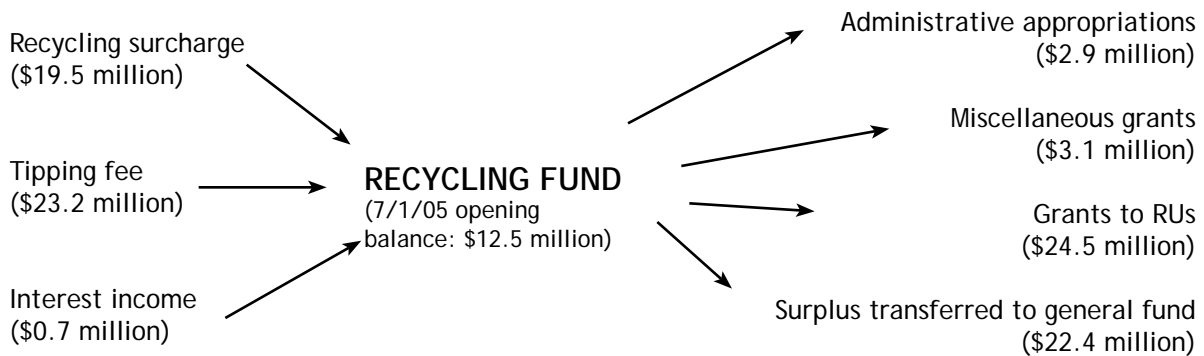
Two other points should be noted. First, the State originally promised RUs that grants would offset approximately 66% of the cost of mandated recycling programs. As it turns out, however, in recent years only about 28% of costs have been reimbursed from the Recycling Fund. The Task Force believes as a general matter that any surplus in the Recycling Fund remaining after the implementation of these recommendations should be used to support the grant program to RUs. (See Recommendations A3 and A4 below.)

Second, a significant amount of additional funding would be required to approach the 66% funding level described above. In 2005, for example, the approximate total cost of qualified RU programs was \$90 million. RUs themselves, however, only received grants totaling approximately \$26.3 million, leaving an unfunded balance borne by the RUs of \$63.7 million. The Task Force has not formalized a recommendation on whether or how to raise additional revenue to address this unfunded balance. We understand that municipalities, if they choose to do so by referendum, could exceed levy and expense caps to cover additional costs associated with recycling and waste reduction programs. In any event, should there be stakeholder support for funding grants to RUs at levels higher than recent practice, or for that matter to fund these recommendations should the Recycling Fund surplus be used for other purposes, a number of options were discussed by the Task Force as follows:

¹ <http://www.legis.state.wi.us/lfb/informationalpapers/64.pdf> and DNR Bureau of Management and Budget

² Id.

Figure 6.5: Recycling Fund Cash Flow (2005-06)



- **Increase tipping fees.** Revenue could be generated by an increase in the “recycling fee” and/or surcharges on transfer stations and waste generators as appropriate.³ This has the advantage of tying into an existing mechanism for administrative convenience, although - absent a significant increase in the tipping fee - it may not affect behavior at the generator level to focus on recycling and other forms of recovery.
- **Impose fees on other solid waste services.** Other fees could be considered as well, such as a solid waste service fee, advance recycling fees (although these would primarily apply to the product subject to a fee in the first place, like electronics or bottles), or a tire fee. For example, the State of Minnesota imposes a Solid Waste Management (SWM) Tax based on a percentage of the sales price for municipal solid waste services. The tax rate is 17% for commercial entities and 9.7% for residential services, with revenues over \$50 million in the 2004 tax year.
- **Waste generator charges.** Revenue could be generated from a pay-per-volume program as

³ During Task Force deliberations, a formal motion was made to recommend a \$2 to \$3 per ton increase in the state tipping fee. The motion failed to carry.

well. Briefly, new incentive programs could be developed to alter disposal-versus-recycling behavior pattern at the generator level. In many Wisconsin communities, residential consumers are discouraged from disposing of materials through a pay-per-bag program. Commercial businesses already pay by the ton or by the cubic yard of solid waste that their containers can hold, which can motivate them to capture recyclables and lower disposal costs. This program also places financial responsibility for minimizing the volume of waste requiring incineration or land disposal on the generators themselves by making them pay for making the decision to dispose rather than recycle. Administration of the program at the local level could replace the state fee and grant program that currently exists, since funds could be assessed and utilized locally to administer and enforce the solid waste planning and recycling programs. (The Task Force recognizes the controversy of this issue. A more moderate requirement for volume based fees was enacted in 1989 Act 335, which set up most of Wisconsin’s current state recycling program, but that provision was removed by subsequent legislation.)

We recognize that this remains a contested issue,

and Task Force members continue to hold diverse points of view on this subject. Indeed, the Governor and Legislature may have different views on funding altogether. Above all, the Task Force strongly recommends that the Legislature, the DNR, RUs and other stakeholders work together to assure that adequate funding is available to carry out the measures envisioned by the Task Force as an integrated system of waste resource recovery and disposal.

One final word before presenting the Task Force recommendations. There is no silver bullet. An effective state policy likely depends on a wide range of actions, a combination of measures designed to achieve overall state objectives. What is required to achieve these objectives will change over time, just as markets and public habits will change, and the state must be prepared to adapt over time as well. A creative and flexible approach will help Wisconsin adhere to its proud history of effective management of natural resources.

7

Recommendations

A. Minimize Environmental, Economic and Social Costs

Introduction

The Task Force concluded that Wisconsin should place more emphasis on economics—broadly defined—to focus on all costs and benefits when addressing issues of waste recovery and disposal in the future. This theme is apparent throughout our recommendations. In this first section, we recommend that more resources be devoted to economic analysis in our state. We also recommend that the financial wherewithal to improve our waste management system be provided through preserving and appropriating revenue in the Recycling Fund and broadening goals for spending associated revenues. Steps should be taken to require effective planning and to increase regional cooperation in order to realize economies of scale and achieve other objectives.

A1. Improve and expand the use of economic analysis in solid waste policy and management decisions.

Background

Part of Governor Doyle's charge to the Task Force was to:

“Study and make recommendations regarding the economics of landfilling and recycling of solid wastes, including *the full environmental costs and benefits, and the extent to which those costs and benefits are reflected in the prices of landfilling and recycling and the associated fees collected by the state.*” (Emphasis added.)

In this section

- A** Recommendations designed to minimize environmental, economic and social costs
- B** Recommendations designed to enhance producer responsibility for products
- C** Recommendations designed to promote effective resource recycling and recovery
- D** Recommendations designed to promote responsible waste disposal
- E** Recommendations designed to promote ecological and environmental sustainability

This acknowledges an important gap in how we as a state have viewed solid waste issues in the past. The full social costs and benefits of alternative strategies for waste recovery and disposal have not been considered. Social costs are not currently reflected in the prices of landfilling and recycling and the associated fees collected by the state.

Currently, when economics is considered, the focus is nearly always on financial costs and revenues. The starting point is the out-of-pocket costs borne by public and private entities as they collect Wisconsin's solid waste materials and dispose or process them through landfilling, recycling, composting, and incineration. There are some offsetting revenues that are also frequently considered. For example, it is now common to collect landfill gases and burn them to produce and sell electricity. Recycling facilities throughout Wisconsin are salvaging valuable materials such as aluminum and using the resulting revenue to offset at least part of their

costs. This is fine as far as it goes, but considering only financial costs and revenues can distort our understanding of the economic merits of the various strategies involved in waste recovery and disposal.

The problem is that financial costs and revenues do not reflect what economists refer to as external costs and benefits. External costs and benefits are not borne by the entities that manage solid waste but by the broader public. Many external costs are easy to see. Collection of trash and recyclables involves the use of trucks that emit air pollutants that affect health and environmental quality. Landfills, incinerators, compost piles, and other disposal methods are well known sources of air pollutants such as particulates, methane, and ammonia. Focusing only on financial costs leaves the costs associated with these pollutants and other pollutants unaccounted for. There can also be external benefits from waste disposal. For example, electricity generated at a landfill or waste-to-energy incinerator often displaces electricity that would otherwise be generated at coal-fired power plants. Reduced coal burning has well-known environmental benefits.

The pitfalls of ignoring external costs and benefits are easily illustrated. Over the years, Wisconsin has often faced the question of how much and which parts of the waste stream should go to recycling. Looking only at financial costs and revenues could lead to a conclusion in favor of discarding items that could be recycled, since recycling is costly and some of the materials that could be recovered through recycling have a low market value. The conclusion might be very different if the external costs of disposal and the external benefits of recycling to the environment were counted.

From an economic point of view, therefore, when considering questions like whether recycling of a given kind of material is justified, all costs and benefits, both financial and external, should be counted to the extent possible. Appendix D presents a more detailed framework for estimating the net social costs of waste recovery and disposal ac-

tivities that could be adopted by agencies such as the Department of Natural Resources (DNR) in the future. Net social costs are calculated by adding financial and external costs and subtracting offsetting financial revenues and external benefits.

Very interesting work done in the European Union (EU) and discussed in more detail in Appendix D shows how counting only financial costs could lead to poor decisions when comparing landfilling and recycling strategies. The EU study¹ was innovative in the way it looked at recycling. It not only accounted for external costs of collecting recyclables and processing them, but also the reduced external costs when recycled materials replaced raw materials that would otherwise come from virgin sources.

Recycling means that there are fewer external costs from mining, transportation, and processing of virgin materials. Accounting for these reduced external costs meant that recycling had a positive net benefit of €130 per metric ton of materials recycled. From the perspective of society as a whole, therefore, recycling more than pays for itself by reducing the external effects of using equivalent amounts of virgin materials. By contrast, the net social cost of landfilling was estimated to be €91 per metric ton after allowing for external costs and the positive benefits of power production from landfill gases.

Following up on this lead, the Task Force attempted to measure the net social costs of dealing with Wisconsin's municipal solid waste stream. The primary tool used was the Decision Support Tool (DST), a computer model developed for the U.S. Environmental Protection Agency (EPA). The DST combines what is known about solid waste collection and processing in the US to predict financial costs, energy use and air and water emissions. In dealing with the model itself and in attempting to quantify benefits and costs, uncertainties were encountered at every turn. We were forced to use many assumptions, but we did so with those that seemed realistic in the judgment of Task Force members and others work-

¹ Brisson (1997).

ing in the field. Resulting estimates must be viewed as very preliminary attempts to quantify the net social costs of dealing with our state's wastes. Further study might come up with very different numbers.

Still, as reflected in Appendix D, our results are very interesting and suggestive. Like the EU study, we found that, once reduced external costs of replaced virgin materials are accounted for, recycling has a positive net benefit. In fact, under one set of assumptions, this net benefit could run as high as \$185 per ton. If this number stands up under further scrutiny, it would mean that each ton of waste material entering recycling is producing \$185 in economic gains for society as a whole.

We also looked at landfilling and incineration. The DST accounts for emissions to the environment from collection and transportation of materials and their disposal in landfills, including emissions from electricity generation. Electricity generated from incinerators and methane gas is substituted for electricity generated from conventional sources. This results in reduced emissions from conventional sources, which are subtracted from the equation. Added together, under one set of assumptions, the net social cost of landfilling wastes in Wisconsin turned out to be slightly under \$100 per ton. The net social cost of incineration was estimated at \$52 per ton.

An important conclusion follows: Though we in Wisconsin have much to learn about the economic advantages of alternative strategies to deal with our solid wastes, from what we know now, it appears that increasing rates of recycling have a strong economic justification provided the costs are not too great.

Much more can be done to improve on this very tentative analysis. The Task Force recommends that Wisconsin policy makers and regulators do more to measure the full net social costs of waste management strategies and consider them in making decisions about how the waste stream is to be managed in the future. Specific steps to accomplish this are suggested below.

The Task Force also recognizes that economic

principles could also be used to help the state seek more efficient and effective ways to regulate the waste recovery and disposal system. Environmental economics has done much in recent years to develop incentive-based regulatory mechanisms and make them practical. Such mechanisms involve the use of monetary incentives to achieve environmental and other goals. Incentive-based mechanisms have already been adopted to address such problems as air pollution from power plants and regulation of commercial fisheries.

The goal of incentive-based mechanisms is to bring the prices consumers face and the revenues and costs of businesses and other institutions more in line with the full social benefits and costs of the choices they make. Doing so provides financial incentives for them to make choices that reflect those benefits and costs.

In fact, many Wisconsin communities have experimented with incentive-based mechanisms. We refer to the more than 200 communities that, prior to 2000, received special grant status for implementing "pay as you throw" programs. Some communities, for example, required households to purchase pre-approved bags for trash with the cost per bag including a fee for disposal and, in some cases, pickup as well. There is much positive evidence, in those communities that have implemented programs successfully. As summarized in Appendix D, that volume-based fees increase household recycling and reduce the volume of waste going into landfills. Other communities, however, have identified concerns, such as higher rates of illegal dumping and open burning. In any event, incentives should be studied, including incentives for non-residential waste, which constitutes a majority of what is landfilled in the state.

As another example, consider the beverage container deposit-refund systems, which are now used in 11 states, including neighboring Iowa and Michigan. Consumers pay a deposit per container when they purchase beverages and receive a refund when they return the container. So far, Wisconsin has chosen

not to adopt such a “bottle bill” and this issue is addressed in another recommendation. Our purpose here is to point out that if Wisconsin wants to increase beverage container recycling rates and reduce littering, it is clear that deposit-return systems work.

As noted elsewhere in this report, Wisconsin currently recycles about 55% of all the aluminum containers discarded here, with the rate somewhat higher for glass containers and somewhat lower for plastic. Michigan is currently recovering about 95% of the beverage containers sold. Furthermore, deposit-return systems

appear to have potential for much broader applications. For example, the Task Force learned about the growing problem of plastic materials that are used in agriculture and then discarded. A deposit-return system might be used to increase the amounts of agricultural plastics that are reused or recycled.

The Task Force believes that the time is ripe for Wisconsin to use more incentive-based mechanisms to regulate both the quantity of materials entering the waste stream and the quality of those materials.

A1. Recommendations to improve and expand the use of economic analysis in solid waste policy and management decisions

Goal	To increase the efficiency and effectiveness of material use, reuse, recycling, and disposal in Wisconsin through policy and regulatory decisions based on improved recognition of the external costs and benefits of alternative strategies and through the use of incentive-based regulatory mechanisms.
Objectives	<ul style="list-style-type: none"> ■ To increase the pool of people in our state with training in the concepts of environmental and natural resources economics. ■ To add an economist with expertise in environmental economics and solid waste management to the staff of the Department of Natural Resources. ■ To conduct research on the net social costs of solid waste management that will directly address issues of immediate concern to the state. ■ To establish a program within the DNR to evaluate the efficacy of alternative incentive-based mechanisms through pilot projects in Wisconsin communities.
Recommendations	<p>A1.1: Increase expertise of environmental and conservation staff with training in environmental economics.</p> <ul style="list-style-type: none"> ■ Require at least one semester of environmental and natural resources economics as part of the curriculum of all environmental and conservation students in the University of Wisconsin System. <p>A1.2: Add an environmental economist to staff in the DNR Bureau of Waste & Materials Management.</p> <ul style="list-style-type: none"> ■ Currently, the DNR lacks the environmental economic expertise to address solid waste management issues. Create a new staff position for an economist qualified in environmental and natural resources economics with an emphasis on solid waste management issues.
<i>Action required by UW System</i>	
<i>Action required by DNR & Legislature</i>	

A1. (continued) Recommendations to improve and expand the use of economic analysis in solid waste policy and management

A1.3: Conduct economic research that directly addresses emerging solid waste policy and regulatory issues.

*Action required by
DNR*

- Once in place, the DNR economist should conduct research on both the value of environmental externalities of solid waste and material management and instruments to effect an improvement in decision making and management.
- Additional research should be funded and administered within a suitable structure in the DNR. Funding should go to researchers within the University of Wisconsin System Solid Waste Research Council (including the University of Wisconsin Extension), other colleges and universities, and other entities as appropriate.
- The DNR should seek to leverage research funds by joining forces with other entities such as the U.S. Environmental Protection Agency.
- One of the early research projects should involve a thorough review of scientific literature on incentive-based regulatory mechanisms for solid waste management and experience with such mechanisms in other jurisdictions both in the U.S and other countries.

*Action required by
DNR*

A1.4: Establish pilot projects in Wisconsin communities to evaluate the efficacy of alternative incentive-based mechanisms.

- The DNR economist should conduct research or fund research projects by Responsible Units of Government (RUs) (see background discussion in Recommendation A2) and other qualified organizations to assess pilot projects and evaluate the possible usefulness of such mechanisms for permanent adoption in Wisconsin.

*Action required by
DNR*

A1.5: Factor external costs beyond state boundaries into Wisconsin policy decisions on solid waste management.

- External costs include those with impacts beyond Wisconsin's boundaries. These costs should still be considered in Wisconsin policy decisions.
 - Wisconsin should advocate nationally and with neighboring states to do the same.
-

A2. Promote effective solid waste planning and implementation as well as regional cooperation for both.

Background

To consider options for solid waste planning, it is important to understand the current structure for recycling programs in Wisconsin.

Section 287.09(1), Wis. Stats, first introduced the term “Responsible Unit of Government” (RUs) with the advent of landfill bans of the late 1980s and early 1990s. As defined, RUs meant any form of local government, from tribal units, to small townships, to large cities, to counties. Any and all types of municipalities could gain RU status. Currently, there are no fewer than 1,100 RUs in Wisconsin.

RUs must develop and implement a recycling program (or other types of programs) to manage materials banned from landfills.² RUs also have authority to adopt ordinances for their recycling programs and to enforce such ordinances.

Section 287.11, Wis. Stats, outlines the activities RUs must conduct to ensure they provide “effective recycling programs.” This includes, but is not limited to, educating their citizens about recycling, providing recycling collection services (curbside or drop-off), developing a system for processing and marketing collected recyclables, and taking measures to ensure that materials banned from landfills are indeed not landfilled. When RUs meet these terms, they may apply for and qualify for the Responsible Unit Cost-share to offset the costs of effective programs.

In addition to cost-sharing, a Recycling Efficiency Incentive (REI) grant is available to RUs. It encourages RUs to merge or to work “cooperatively” to gain efficiencies within their collective recycling programs. Unfortunately, the REI grant has not completely realized the goal of reducing RUs, as mergers sometimes result in financial penalties to the partner RUs.

Current law does not assign responsibility for

overall solid waste planning to a particular government entity, and local governments vary widely in their efforts towards planning and implementation of solid waste services. Section 289.10, Wis. Stats, for example, authorizes - but does not require - a county or several counties working together to “prepare and adopt” a solid waste management plan. The state’s recycling law requires local governments to assure management of unrecycled waste consistent with the state’s preferred hierarchy, but again no specific action is required. As a result, essential needs are not being met consistently throughout the state, to the detriment of both residents and the environment.

Nearly 1,100 counties, cities, towns, villages and tribes - acting as RUs - are responsible for recycling initiatives. By contrast, no entity is specifically charged with planning and providing for other waste management needs, such as long-term waste disposal planning and household hazardous waste management. As a result, comprehensive services may be provided in one community, but orphaned in the next.

On another point, some local governments have successfully cooperated to implement regional programs. Others, though, have not taken this step, or have been stymied by barriers such as a potential net loss in state recycling assistance.

In the end, there has been a failure, therefore, to embrace the implicit scope of “integrated solid waste management,” which should include planning for all forms of solid waste management, from recycling to household hazardous materials to the siting of landfills and incinerators. Otherwise, as has been the case in Wisconsin, fractured and disparate services are made available in a mix of programs that falls far short of a fully integrated system.

The Task Force also views planning as a critical component in an integrated system. Plans must be developed to guide decision-making at the local level and to provide metrics against which to judge progress and performance. The question, however, is who should do the planning? A simple answer is not apparent.

In some parts of the state, it may make sense for

² Section 287.09(2), Wis. Stats.

counties to do solid waste planning. In other situations, however, regional planning may be appropriate or available. Success in this regard has already been demonstrated in the Fox Valley, where Brown, Winnebago and Outagamie Counties have coordinated planning for certain key solid waste services. In other highly populated areas of the state, planning at the municipal level may be more viable and appropriate. On a more regional basis, planning may be appropriate in certain "waste sheds," meaning those areas where most waste is directed to a single disposal facility.

The Task Force does not feel that it can choose a single, appropriate body for waste management

planning purposes. Instead, DNR - working with various stakeholders - must evaluate the outcome of appropriate pilot studies and then develop a program to identify appropriate bodies or regions for solid waste management planning purposes, set forth requirements for creating such plans, and provide necessary technical and financial assistance.

Once plans are in place, DNR should develop and administer a program designed to ensure consistent and effective implementation of such plans at the RU level.

A2. Recommendations to promote effective solid waste planning and implementation as well as regional cooperation for both

Goal	To upgrade planning as a mechanism to assure that local solid waste management practices are implemented in a manner designed to promote consistency on a more regional basis and to improve the effectiveness and cost-efficiency of, and access to, such services for both residential and non-residential sectors.
Objectives	<ul style="list-style-type: none"> ■ Improve solid waste planning at the local or regional level, and then require implementation of services consistent with plans as a mechanism to coordinate more efficient and cost-effective services. ■ Improve the level of coordination and cooperation among RUs to achieve more efficient and cost-effective services. ■ Assist RUs in adapting to changes in technology, markets, and statutes.
Recommendations	<p>A2.1: Conduct pilot studies to evaluate options for comprehensive solid waste planning.</p> <ul style="list-style-type: none"> ■ The DNR should select at least five municipalities, counties, or multi-government entities to receive financial assistance for a pilot planning project. ■ Pilot projects should be designed so as to help develop standards for measuring the effectiveness of planning initiatives in general, including the degree to which plans can be designed, can be implemented, benefit the environment, and result in improved services and lower costs. (Pilot projects on key topics like household hazardous waste, universal waste, and scrap electronics could be considered, too.) ■ Pilot projects should require input from a variety of stakeholders, including residents, local communities, the business community, and the solid waste industry.
<i>Action required by the DNR & certain local government entities</i>	

A2. (continued) Recommendations to promote effective solid waste planning and implementation as well as regional cooperation for both

- Pilot project plans should be reviewed and approved by the DNR.
- The DNR should initiate the pilot projects, and evaluate their eventual outcome, as expeditiously as possible.

A2.2: Based on DNR's experience in general, and the outcome of appropriate pilot studies, revise state statutes to require the development of solid waste management plans on a local or regional basis pursuant to a program to be developed and administered by the DNR.

Action required by the Legislature, the DNR & stakeholders

- The DNR - based on the outcome of the pilot studies and working with various stakeholders - should identify appropriate bodies or regions for solid waste management planning purposes and then require those bodies to develop solid waste management plans.
- The DNR should define requirements for the development of solid waste management plans by the planning bodies so designated. At a minimum, plans should be developed with input from a variety of stakeholders, including residents, the business community, and the solid waste industry.
- The DNR must provide technical and financial assistance for the development of these plans.
- Plans should be reviewed and approved by the DNR.
- A mechanism to enforce this requirement should be developed.
- The DNR should require plans to be updated periodically as appropriate.

A2.3. Revise state statutes to require that RUs - either individually or in cooperation with other RUs - comply with and implement such solid waste management plans as may be applicable to their respective jurisdiction(s).

Action required by the Legislature, the DNR & RUs

- DNR should develop a mechanism to evaluate periodically whether RUs are adequately implementing applicable solid waste management plans.
- Financial assistance should be provided for implementation of these plans. Preference should be given to multi-RU plans.
- A mechanism to enforce this requirement should be developed by the DNR.

A2.4. Where it is effective to do so, encourage regional cooperation in comprehensive, integrated solid waste planning and implementation.

Action required by the DNR & other stakeholder units of government

- Provide incentives to promote regional cooperation (such as expedited grant funding, additional funding for combined household hazardous waste collection).
- Develop regulatory language that would serve as a template for designing, managing and governing regional solid waste cooperatives. Eliminate barriers to such cooperatives.

A3. Preserve funds generated by the Recycling Fee and appropriate them to implement these recommendations and other solid waste reduction and beneficial reuse programming.

Background

Wisconsin's recycling law gave primary responsibility for the implementation of recycling programs to local units of governments known as "responsible units" (RUs). RUs operate recycling programs ranging from local drop-off sites to curbside service.

Although programs differ, some basic requirements for recycling are mandated. To help with the cost of these mandates, 1989 WI Act 335 established a mechanism for funding local recycling programs. A "recycling fee" was imposed on every ton of waste landfilled, and a tax surcharge was imposed on certain categories of businesses. Monies collected from these sources are directed into a "segregated fund" for the purpose of providing financial assistance in the form of grants to RUs with "effective recycling programs." The segregated fund is called the "Recycling Fund."

The figure varies with each budget cycle, but the formula for funding the Recycling Fund typically generates revenue in excess of expenses, so there has consistently been a surplus in this account. A pattern has developed, however, by which significant portions of these surplus funds have been diverted to the general fund for budget balancing purposes. The amounts transferred in 2003-04 and 2004-05, for example were \$7.3 million and \$6.8 million respectively.

Although based on rough, order-of-magnitude calculations, the level of funding required to implement the recommendations in this report is likely to

range from \$6 million to \$10 million in the first year and perhaps \$5 million to \$7 million annually thereafter. Based on current projections, therefore, assets in the Recycling Fund, if retained for use on waste reduction and recycling initiatives as set forth in this report, would be adequate to implement and sustain these recommendations in the coming years.

It should be further noted that the grant program does not meet the cost of providing an effective recycling program. The original promise was that grants would offset approximately 66% of the cost of an effective recycling program operated by an RU. In reality, however, only about 28% of costs have been reimbursed. Excess revenue generated in the Recycling Fund should be available to provide higher levels of funding to RUs operating mandatory recycling programs in an effective manner.

(See next page for recommendations.)

A4. Modify the formula for grants from the Recycling Fund to meet the needs of RUs more effectively.

Background:

The current formula used to distribute grant monies (developed in 1999) prevents many RUs from obtaining all of the funding they might be eligible to receive. This has resulted in both under-funded RUs and, in some cases, over-funded RUs.

The current formula should be revised. By expanding the scope of those activities that qualify for contributions from the Recycling Fund, the state could both support new and innovative programs and eliminate the likelihood that funds would be left unused in the Recycling Fund.

(See next page for recommendations.)

A3. Recommendations to preserve funds generated by the Recycling Fee and appropriate them to implement these recommendations and other solid waste reduction and beneficial reuse programming

Goal	To preserve all funds generated through the recycling fee for use as intended to support effective reuse and recycling programs.
Objectives	<ul style="list-style-type: none">■ To ensure funding to implement the recommendations in this report.■ To ensure that the funds generated by the recycling fee are preserved to help RUs meet the cost of conducting effective recycling programs and other waste reduction and beneficial reuse programs.
Recommendations	A3.1. Ban diversions from the segregated fund so that all monies raised from the Recycling Fee are preserved to implement these recommendations and other recycling, beneficial reuse, and waste reduction programs.
<i>Action required by the Legislature</i>	<ul style="list-style-type: none">■ Enact a ban on fund diversion. Although using a unique mechanism, the energy fund was structured so as to avoid fund diversions.
<i>Action required by the Legislature</i>	A3.2. Appropriate all revenue from the segregated fund to implement these recommendations and other recycling, beneficial reuse and waste reduction programs.

A4. Recommendations to modify the formula for grants from the Recycling Fund to meet the needs of RUs more effectively

Goal	To assure the equitable distribution of grant monies among RUs and to expand the scope of activities conducted by RUs that qualify for support from the Recycling Fund to promote effective recycling, beneficial reuse or waste reduction programs.
Objectives	<ul style="list-style-type: none">■ To ensure that the grant formula is revised to achieve equitable distribution and more adequately meet the costs of conducting effective recycling programs and other waste reduction and beneficial reuse programs.■ To incorporate other recycling and beneficial reuse programs into the matrix of allowable expenses for reimbursement under the terms of a RU grant.
Recommendations	A4.1. Modify the formula used to calculate the redistribution of RU grant monies to assure equitable distribution among RUs to more adequately meet the costs of conducting effective recycling programs and other waste reduction and beneficial reuse programs.
<i>Action required by the Legislature & the DNR</i>	<ul style="list-style-type: none">■ s. 287.23, Wis. stats., and NR 542.06, Wis. Adm. Code, should be revised so as to devise a new method for the distribution of Recycling Fee monies to more adequately fund effective recycling programs.
<i>Action required by the Legislature & the DNR</i>	A4.2. Incorporate other recycling and beneficial reuse programs into the matrix of allowable expenses for reimbursement under the terms of a RU grant.
	<ul style="list-style-type: none">■ NR 542.05, Wis. Adm. Code, should be revised so as to expand the list of eligible programming costs that may qualify for reimbursement.

B. Enhance Producer Responsibility for Products

Introduction

Those who design and produce the products we buy often make decisions about product characteristics and packaging that fail to take into account the social costs of eventual recycling and disposal. The next two sets of recommendations involve steps to bring the incentives producers face more into line with the waste recovery and disposal costs they impose on the public.

B1. Maximize the collection and reuse of discarded electronic devices.

Background

Wisconsin residents are estimated to have disposed of more than one million computers in Wisconsin landfills from 2002 through 2005, with an increasing amount discarded each year. It is estimated that during 2006 over 37,000 tons of electronics will be discarded.

Electronic products contain a number of toxic and hazardous materials which pose a potential risk

to the environment and public health of future generations if placed into landfills. These include lead, cadmium, and mercury. Under current Wisconsin rules, businesses must recycle their used CRTs from televisions and computers, but residents are exempted under the household exemption from hazardous waste management requirements.

The Department of Natural Resources (DNR) is currently working with other Midwestern states in an attempt to coordinate efforts to promote the proper management of used electronic waste and avoid placement in Midwest landfills.³ Because of the interstate movement of municipal solid waste, efforts by Wisconsin alone will not eliminate the placement of these items in Wisconsin's landfills. The Midwest E-Waste Initiative group is also examining potential infrastructure, funding mechanisms (including extended producer responsibility) and other issues associated with the management of electronic waste.

³ The five states involved with the initial Midwest E-Waste Initiative are Minnesota, Illinois, Iowa, Michigan and Wisconsin. This group has identified the environmental risks associated with landfilling of electronic wastes, existing facilities in the region capable of recovering and reclaiming electronic waste and associated resources, and key tenets of model legislation and regulations to control these materials.

B1. Recommendations to maximize the collection and reuse of discarded electronic devices

Goal

Increase the collection and management of certain discarded electronics, and eliminate disposal of such waste in Wisconsin landfills through statewide legislation consistent with regional initiatives.

Objectives

- Establish state policy, consistent with policies in neighboring Midwest states, promoting environmentally sound reuse and recycling of discarded televisions, monitors, laptops and desktop computers. The policy to finance recycling collection and processing should not unduly burden local or state governments and should embrace principles of shared responsibility among consumers, producers and state and local governments.
- Ban the disposal of televisions, monitors, laptops and desktop computers in Wisconsin landfills and incinerators.

B1. (continued) Recommendations to maximize the collection and reuse of discarded electronic devices

Recommendations

Action required by the Legislature followed by administrative implementation by the DNR

B1.1: Establish state policy, consistent with policies in neighboring Midwest states, to promote environmentally sound recycling and reuse of discarded televisions, monitors, laptops and desktop computers. The policy to finance recycling collection and processing should not unduly burden local or state governments and should embrace principles of shared responsibility among consumers, producers and state and local governments.

- Direct the DNR to continue coordination with other member states of the Midwest E-Waste Policy Initiative.
- Enact legislation consistent with the Midwest E-Waste policy and seek coordination with other Midwestern states in developing either voluntary or mandatory product take back programs.
- The current Midwest E-Waste Policy Development Initiative policy statement reads as follows:

[U]niform legislation should be pursued containing the following elements:

- Manufacturers are responsible for ensuring the collection, transportation, and recycling of waste electronics.
- Manufacturers register with the state.
- Retailers are required to only sell products from registered manufacturers.
- The obligation of manufacturers is determined by the weight of covered equipment sold in a particular state the previous year, although a broader array of electronic devices apply towards meeting the obligation. The Initiative's list of covered equipment is: televisions, monitors, laptops and desktop computers.
- Manufacturers may choose to operate their own program or pay a per pound fee to the state.*
- At the end of each year, the manufacturers submit a report on the amount of material collected for recycling and, if short of their obligation, remit a per pound fee for the remaining amount.
- Retailers report to manufacturers on their sales in a particular state.
- Manufacturers collecting more than their annual obligation may bank the credit towards the following year's obligation or sell it to another manufacturer.
- Manufacturers will have an incentive to provide collection and recycling opportunities in both urban and rural areas.
- Collection agents and recyclers must register with the state to participate in the system.
- All e-waste collected must be handled according to

* The financing mechanism promotes manufacturer responsibility but recognizes that some manufacturers may prefer to implement their responsibilities through fees remitted to state government.

B1. (continued) Recommendations to maximize the collection and reuse of discarded electronic devices

environmentally-sound management standards.

- A disposal ban is to be implemented within two years of enactment.
- The state is authorized to participate in a multi-state entity to facilitate multi-state implementation.
- States may choose to establish a third-party organization to implement provisions of the statute.

B1.2: Ban the disposal of televisions, monitors, laptops and desktop computers in Wisconsin landfills and incinerators.

Action required by the Legislature followed by administrative implementation by the DNR

- The Legislature should ban the landfill disposal of televisions, monitors, laptops and desktop computers. The ban should be effective by the end of 2010. The DNR should develop rules to implement the ban. [This ban complements the landfill ban on universal wastes as contained in Recommendation E1 below. In total, Recommendations B1 and E1 would ban both existing universal wastes and major electronic products from Wisconsin landfills, significantly reduce the flow of toxic metals and other resources to landfills, and promote the reclamation of resources contained in these items.]
-

B2. Require effective product stewardship (additional producer responsibility for the fate of their products).

Background

Wisconsin businesses and consumers purchase and use a variety of items that contain embedded resources, energy, and toxic materials. Technological changes have resulted in the introduction of a wide variety of electronic equipment for the home and office. Even traditional products, such as packaging, tires, rechargeable batteries, and lighting equipment, present potential environmental risks and represent lost resources if not properly managed.

All of these items present various environmental impacts throughout their life cycle, ranging from the initial utilization of raw materials and energy, as well as during production, distribution, consumption and potential disposal. While the manufacturers and distributors of these items are currently responsible for any environmental impacts associated with the initial segments of a product's life cycle, this responsibility ends once it is purchased and used. In many instances, the responsibility and cost for disposal or recycling rest with the end user and ultimately the local community that receives the user's trash and recycling.⁴

The Wisconsin Statewide Waste Characterization Study (2003) found that as much as 2.2 percent of the materials being landfilled in Wisconsin represented "problem wastes" consisting of computers, monitors, televisions and other electronic equipment. This was estimated to be over 101,000 tons

⁴ Dell Computer recently announced a product take-back program whereby anyone with a Dell computer or peripheral device could return the equipment free of charge back to Dell.

of material. The DNR's 2001 Future of Solid Waste Management Report set forth several conclusions, including:

- Many wastes that contain significant levels of hazardous materials and have the potential to threaten human health and the environment are not regulated under hazardous waste laws and are managed in municipal solid waste landfills.
- Some products contain valuable and reusable material.
- It is technically feasible to recycle products such as electronic products and other materials, but substantial financial risk is associated with developing recycling facilities.
- Collaboration with manufacturers and retailers to recycle products and reuse their components is necessary to create the most cost-effective programs.
- Product return and recovery programs by U.S. manufacturers and retailers are still uncommon.

To address the proper management of electronic products and other materials that pose potential impacts or lost resources after they are used, producers should share with users in the associated costs of waste management or reclamation. The financial and external costs of recycling and disposal of these products should be internalized by the manufacturer, thereby providing an incentive for the manufacturer to reduce the potential impact of the product at the end of its life cycle or to develop alternative product or service designs.

The Task Force views this as an additional, necessary step beyond implementation of Recommendation B1 above.

B2. Recommendations to require effective product stewardship (additional producer responsibility for the fate of their products)

Goal	To extend producer responsibility beyond environmental impacts associated with production and distribution to product end-of-life costs.
Objectives	<ul style="list-style-type: none">■ Promote voluntary practices by industry to take back and recycle products at the end of their life cycle from the consumer.■ Establish mandatory product take-back programs that achieve environmental goals in situations where voluntary program don't work.■ Regulate the use and incorporation of toxic materials in electronic and other products with the goal of eliminating toxic materials except where there are no acceptable alternatives.■ Support the establishment of accessible recovery facilities.
Recommendations	<p>B2.1: Promote voluntary practices by industry to recover, reclaim and recycle products at the end of their life cycle.</p> <ul style="list-style-type: none">■ The DNR and the University of Wisconsin Extension should actively distribute information to Wisconsin residents of existing product recycling programs by manufacturers and retailers offering this service.■ The DNR and the Department of Commerce should evaluate the applicability and implementation of voluntary guidelines modeled on the European Union (EU) electrical and electronic product directives.*■ The DNR should enter into dialogue with manufacturers of electronic and electrical equipment to examine changes in product composition, recyclability and material recovery. <p>B2.2: Establish mandatory product take-back and collection programs in all cases where such programs are cost effective compared to other systems for recycling.</p> <ul style="list-style-type: none">■ If voluntary programs do not achieve Wisconsin environmental goals within five (5) years, the Legislature should authorize and require the DNR to implement a mandatory take back or alternative "extended product responsibility" (EPR) program for manufactured products, with the highest priority assigned to those products containing toxic materials, followed by energy and resource-rich products. The priority of establishing programs would be:<ol style="list-style-type: none">a. Toxic materials-containing products<ul style="list-style-type: none">▪ Electronic devices to the extent not covered in Recommendation B1.▪ Lead-acid batteries

Action required by the the Department of Commerce, the DNR & UW-Extension

* EU directives are the Waste Electrical and Electronic Equipment (WEEE) and Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS). Toxic substances of concern are lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polychlorinated diphenyl ethers. Target equipment includes large and small household appliances, IT and telecommunications equipment, consumer equipment, lighting, electric and electronic tools, toys, leisure and sports equipment, and medical devices.

B2. (continued) Recommendations to require effective product stewardship (additional producer responsibility for the fate of their products)

- Rechargeable and other batteries (e.g., nickel cadmium, lithium, nickel metal hydride, mercury, silver, and magnesium)
- Mercury-containing products

- b. Resource or energy-rich products (e.g., tires and drums/barrels)
 - The DNR should take steps to provide a level playing field for EPR programs where all covered product manufacturing parties are held equal and there are no “free riders.”

B2.3: Prohibit the use and incorporation of toxic materials in electronic and other products.

- The DNR should promote voluntary codes of practice for manufacturers to reduce or eliminate the use of toxic materials in products. Initial focus should be on mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls and polychlorinated diphenyl ethers.
- The Legislature should require the DNR to develop and implement required codes of practice for manufacturers where voluntary programs do not achieve state goals within five (5) years.
- The Legislature should ban the use of mercury in products where suitable alternatives exist.
- The DNR and the Department of Commerce should evaluate the mandatory implementation of electrical and electronic product restrictions based on the European Union model.
- In all laws and regulations, the Legislature and the DNR should place the burden of proof on manufacturers to show that the social benefits exceed the social costs of using toxic materials in products they sell in Wisconsin.

Action required by the Legislature, the Department of Commerce & the DNR

B2.4: Support the establishment of accessible recovery facilities.

- The DNR, working with Responsible Units, should utilize existing programs provided by manufacturers.
- The DNR and the Department of Administration should collaborate with manufacturers on the development of manufacturer/retailer take-back programs (i.e., extended producer responsibility programs).
- The DNR and the Department of Agriculture, Trade and Consumer Protection should work with responsible units of government, municipalities and counties to expand the collection of universal wastes, with costs covered by the manufacturers of the products.

Action required by the DOA, the DNR, the DATCP & RUs

C. Promote Effective Resource Recycling and Recovery

Introduction

The next set of recommendations involves steps to promote more cost effective recycling and recovery of construction and demolition debris, waste paper, wood waste, and other materials. Policy and regulatory barriers to dealing with these materials effectively need to be reviewed and modified. More needs to be spent on research and development and education of businesses and the public. New ordinances should be considered at the local level. We also recommend that, at the appropriate time, Wisconsin reconsider instituting a beverage container deposit and return system in order to improve economic incentives for recycling and litter reduction.

C1. Recover more construction and demolition debris and other sources of wood waste.

Background

Construction and demolition (C&D) debris represents 28.7% of Wisconsin's municipal solid waste. Five of the ten largest materials by weight in Wisconsin solid waste landfills are found in C&D debris – wood, shingles, cardboard, scrap metal, and concrete/brick/block. Wood waste from C&D activities alone constitutes 12.8% of municipal solid waste. In addition, wood waste from yard maintenance (trees, branches, stumps, brush and bark) and wood pallets constitute another 1.3% and 1.6% of municipal solid waste respectively. Together, wood waste contributes approximately 747,000 tons of waste to Wisconsin municipal solid waste landfills on an annual basis, and a significant additional amount annually to landfills specifically earmarked to receive C&D waste.

A stronger market infrastructure and changes in

the existing regulatory structure are necessary in order to reduce the share of construction and demolition debris going into the solid waste stream.

Policy and regulatory barriers exist to waste reduction, reuse and recycling construction and demolition debris. These barriers may be environmentally-appropriate and should in that case remain intact, but there may also be unintended barriers which can be amended or eliminated while still protecting environmental and public health. In particular, the Task Force identified the following barriers.

A low-hazard exemption must be obtained and a fee paid to the Department of Natural Resources (DNR) before recycling drywall or wood scraps from new construction, thus creating a barrier to recycling some of the largest materials in the construction waste stream even though best management practices for the recycling of these materials have recently been established.

State law prohibits the sale or transfer of any fixture or other object containing lead-bearing paint that might be placed upon any surface of a dwelling ordinarily accessible to children. Although protecting the environment and the health of children, this also creates a barrier for those who could safely donate or sell reused items with a warning and information on safely handling material with lead-bearing paint.

Concrete with lead-bearing paint (paint that contains more than .06% by weight or .7 mg/cm² of paint surface) may not currently be recycled, although the DNR has recently completed tests showing that concrete with lead bearing paint above those levels may be able to be safely recycled.

Asbestos that is not friable, including that in caulk around windows once the windows are removed, and mastic on floors, can be left on concrete which will be landfilled but not on concrete which is bound for recycling.

In any event, experience in other states suggests that significant components of C&D waste can be effectively reused. Minnesota and Iowa, for example, have adopted standards for the use of shingles in road construction.

Wood waste generated at residential construction and commercial wood frame construction sites bears a significant potential for reuse because of the ease of separating the wood during various stages of construction. Cut-offs and scraps generated during framing and

trimming constitute a relatively clean and homogeneous waste stream that can make an excellent feedstock for engineered wood production. This type of wood waste represents a highly desirable form of recyclable material that processors are eager to obtain.

C1. Recommendations to recover more construction and demolition debris and other sources of wood waste

Goal	To increase the recovery of construction and demolition debris (and other wood waste) for beneficial use and to minimize disposal in Wisconsin landfills, as measured by the Wisconsin Waste Characterization Study and other disposal venues.
Objectives	<ul style="list-style-type: none"> ■ Initiate market development and research on possible uses of materials that can be recovered from C&D waste streams. ■ Remove policy and regulatory barriers to waste reduction, reuse and recycling where environmentally appropriate. ■ Regulatory tools should: <ul style="list-style-type: none"> ▪ Be used to develop an infrastructure for handling recycling materials. ▪ Be phased in to allow time for markets to develop. ▪ Be put in place in conjunction with market development so that regulations do not precede market availability. ▪ Be flexible in order to allow creativity and flexibility in the types of material diverted. ▪ Allow for a workable enforcement mechanism. ▪ Include incentives (for example, funds to companies recycling over a certain percentage, tax incentives, etc.).
Recommendations	<p>C1.1: Initiate market development and research on the recovery and reuse of C&D waste and support the development of an infrastructure for recycling and marketing C&D waste in general and clean, untreated wood in particular.</p> <ul style="list-style-type: none"> ■ Initiate market development and research focusing on construction and demolition debris starting in 2007. Focus should be placed on wood, drywall and shingles as high-priority items. Consideration should also be given to research on the potential for safe recycling of material with asbestos and lead paint. ■ Establish a statewide C&D recycling clearinghouse to coordinate research and market development and market development information. Duties of this clearinghouse will be to develop markets, make market connections, and disseminate market information. The clearinghouse should also coordinate with the Office on Energy on sustainability issues with cross program relevance (i.e., energy conservation) and agencies such as the Department of Transportation regarding shingle recycling. This office should have funding available to conduct or contract for such activities as soil studies, pilot
<i>Action required by the DNR in coordination with stakeholder groups</i>	

C1. (continued) Recommendations to recover more construction and demolition debris and other sources of wood waste

projects, and dissemination of market information. The DNR should contract for this clearinghouse.

- Develop/enhance markets for reclaimed C&D and other wood waste. Investigate and develop best management practices to reduce regulatory barriers for transportation, handling and processing of C&D waste and other wood waste to encourage recycling.

C1.2: Local ordinances should be adopted statewide to require construction and demolition waste recycling.

Action required by the DNR

- A model local ordinance should be developed requiring construction projects to recycle as part of the permitting process.
- The model ordinance should require:
 - a. Submission of a waste management plan including the recycling of, at a minimum, materials banned from Wisconsin landfills including cardboard, cans and bottles, and office paper.
 - b. Submission of final project data which shows recycling rates
 - c. A deposit which is refunded based on proof of recycling. Unclaimed deposits may be utilized to fund enforcement and incentives such as funds to contractors who recycle above a certain rate.
- These ordinances should be required statewide and phased in to allow for public markets to develop. We recommend a phased in approach which takes into account type of project (construction or demolition), whether the project is commercial or residential, size of project, and whether or not taxpayer funds are utilized for the project.
- The DNR should convene stakeholder groups to work on the model ordinance for adoption by local governments.

C1.3: Remove policy and regulatory barriers to waste reduction, reuse and recycling where environmentally appropriate.

Action required by the Legislature & the DNR

- Remove the requirement for a low-hazard exemption for recycling untreated, new construction wood and new construction drywall. Recyclers would instead follow best management practices set by the DNR or, if practices are not followed, may be fined under solid waste rules.
- The DNR should remove regulatory barriers to reuse and recycling and institute best management practices to encourage recycling and reuse while protecting the environment and public health.
- Consider establishing a separate management category under solid waste processing rules for wood waste, rather than managing these under the composting rules.
- If general, unseparated wood waste is still shown to be a significant contributor to Wisconsin landfills and incinerators after 2012 (per statewide waste characterization studies), then the Legislature should consider stronger measures to recover wood waste such as prohibiting

C1. (continued) Recommendations to recover more construction and demolition debris and other sources of wood waste

disposal in Wisconsin landfills or incinerators of more than incidental quantities of clean, untreated wood from residential and commercial construction projects, wood pallets, and yard waste over six inches in diameter. "Incidental quantities" will be defined through rule making and include language related to a discrete amount of wood waste of a certain size or weight and for which the "recyclable quality" could be relatively easily assessed based on visual inspection.

C1.4: The Wisconsin Department of Transportation should be instructed to determine whether and how shingles can be safely incorporated into road construction projects and if recycled wood can be used for highway beautification and erosion control projects.

Action required by the DNR

- The Wisconsin Department of Transportation (DOT) should examine whether and how pre-consumer and tear-off shingles can be safely incorporated into road construction projects.
- The DOT should further examine whether and how recycled wood chips and recycled compost can be used to establish vegetation in disturbed areas, for highway beautification, and for erosion control.
- Pilot studies should be conducted if necessary. The DOT should work with other agencies and organizations to research, test and develop best management practices for potential uses.
- Assuming safe usage, best management practices should be developed for handling tear-off shingles, and using them in road construction. Specifications for construction should be edited, if necessary, to remove barriers to implementation of these best management practices. Best management practices could include grinding size specification, percentage of tear off shingles allowed, separation of tear-off shingles from mastic and other adhesives during removal, and available uses.

C2. Recover more scrap paper.

Background

Unrecovered paper represents 20.8% by weight of the municipal solid waste stream in Wisconsin (about 990,000 tons per year). An estimated 50% of this paper is recyclable. Three of the top ten materials found in the waste stream are from the paper category (compostable paper, mixed recyclable paper, and recyclable cardboard).

Cardboard is one of the recyclable materials banned from Wisconsin solid waste disposal facilities in the absence of a recycling program. About

63% (119,000 tons per year) of the 188,000 tons per year of recyclable cardboard found in the waste stream comes from commercial, industrial and institutional sources.⁵

Recyclable cardboard and mixed paper should be viewed as valuable raw materials that are subject to strong demand both within Wisconsin and on the global market. One of the main reasons identified for not recycling this paper is the perception that recycling is viewed as an added cost for business. As a result, the recycle paper industry is losing this raw material because of problems in collection, contamina-

⁵ Wisconsin Waste Characterization Study (2003).

tion, and the need to keep recycling systems easy and convenient for people. Some of the problems highlighted by the paper industry are “stickies” (sourced from various adhesives, e.g., peel-and-stick labels or hot-melt adhesives), crushed glass, food waste and possible deterioration in paper grade quality in some cases, but not all cases, associated with single stream recycling collection and processing systems.

Using a mixed paper value of \$50/ton and assuming that 50% of the 990,000 tons of the unrecovered paper is of recyclable quality, this presents a potential resource of \$24,750,000/year, plus a landfill avoidance cost of \$25/ton or \$12,375,000/year.

C2. Recommendations to recover more scrap paper

Goal	To recover more waste paper for productive use and to reduce the amount of usable recovered paper in the municipal solid waste stream sent for land disposal or incineration to less than 15% of total weight in five years and less than 10% of total weight in 10 years. Focus will be on reducing or eliminating recyclable cardboard entirely from the solid waste stream.
Objectives	<ul style="list-style-type: none"> ■ Increase and promote household and business recycling of all recyclable paper. ■ Make recycling easier. ■ Increase education on the value of recovered paper as a potential resource. ■ Apply incentives and penalties to promote paper recycling. ■ Reduce the contamination of recovered paper.
Recommendations	<p>C2.1: Increase and promote household and business recycling of all recyclable paper.</p> <ul style="list-style-type: none"> ■ Add office paper and mixed paper to residential recycling requirements and mixed paper to commercial recycling requirements (Section 287.07(3) and (4), Wis. Stats). ■ After enactment and the next Statewide Waste Characterization Study has been conducted, if paper is still shown to be a significant contributor to Wisconsin landfills and incinerators, (i.e., the goal of this recommendation has not been met), then the Legislature should consider stronger measures to recover paper such as prohibiting disposal in Wisconsin landfills or incinerators of more than incidental quantities of newspaper, magazines, corrugated cardboard, office paper and mixed paper that is of recyclable quality. “Incidental quantities” will be defined through rule making and include language related to a discrete amount of paper contained in a bundle of a certain size or weight and for which the “recyclable quality” could be relatively easily assessed based on visual inspection. This would replace the current law, which requires mandatory recycling ordinances, but does not ban the landfilling of these materials if
<i>Action required by the Legislature & the DNR</i>	

C2. (continued) Recommendations to recover more scrap paper

generated in an area served by a DNR-approved RU.

- Educate the public and small businesses of the value of recovered paper as a raw material.
- Identify and encourage new markets for low-end co-mingled recovered paper; for example in use such as animal bedding, building materials and molded cartons.

C2.2: Make recycling easier.

*Action required by the
DNR & stakeholders*

- Ensure collection services are readily available in areas not currently serviced.
- Look at other states' and European models for recovered paper collection within communities and determine if they can be adopted or adapted for use in Wisconsin.

C2.3: Increase education on the value of recovered paper as a potential resource.

*Action required by the
DNR & stakeholders*

- Create advertising campaigns.
- Promote knowledge through increased education and information, within schools and other educational institutions as well as households and small businesses, that recovered paper is a valuable raw material and is not necessarily a waste material.
- Promote collection and recycling of paper grades in addition to newsprint, magazines, office papers, old corrugated containers and mixed papers.

C2.4: Create incentives and penalties.

*Action required by the
DNR, the Department
of Commerce &
the Department of
Revenue*

- Ensure small and mid-size businesses are connected with responsible business units or private companies for effective collection of their recovered paper.
- Assist Wisconsin-based companies to use more of the low-end recovered paper. This could be through grants or low-cost loans to install sorting equipment at the paper recycling centers or processing equipment within the paper mills.
- Direct the DNR to develop statewide strategies to enforce recycling rules for business and commercial paper recycling.

C2.5: Reduce the contamination of recovered paper.

*Action required by the
DNR & stakeholders*

- Work with groups such as the Wisconsin Council on Recycling to reduce contaminants that are not compatible with paper recovery.
- Work with purchasing agents in state and local governments and the private sector to adopt standards to purchase "environmentally benign pressure sensitive adhesives" (EBPSAs).
- Work with office supplier manufacturers, wholesalers and retailers to sell EBPSAs.
- Identify other contaminants in recovered paper and develop action plans to reduce their use.

C3. Reduce and recover more organics.

Background

The Governor instructed the Task Force, among other things to recommend ways to maximize the productive use of materials by composting. According to the Wisconsin Statewide Waste Characterization Study (2003), food residuals constitute 10.2% of total Municipal Solid Waste (MSW) and food-soiled compostable paper constitutes another 14.7%. In addition, wood waste, which has already been discussed in Recommendation C1, contributes another 14.1% of MSW through such things as untreated lumber, engineered wood and sawdust, trees, branches, Christmas trees, and bark. Taken together, the amount of this material sent for disposal is approximately 1,461,000 tons per year. If separated from MSW, however, organic materials can be diverted from disposal for use in a number of valuable and beneficial ways, such as the following:

- Food recovery for human use (e.g., food-to-people programs)
- Food recovery for livestock feed (e.g., food-to-hog programs)
- Composting or co-composted with yard materials or other organic feedstocks in windrows or static piles
- Energy recovery production through anaerobic digestion or conversion to biofuels.

Compost is a valuable product that rejuvenates soils, reduces water and pesticide needs, decreases erosion, and, in some cases, remediates contaminat-



Home composting units such as this one could help reduce the volume of organic wastes going into landfills. Photo courtesy Milwaukee Department of Public Works.

ed soil. Converting organics into compost sequesters carbon in soil and mulch and helps to reduce greenhouse gas emissions that contribute to global warming (although there are still emissions from composting itself). Composting is also a way to manage phosphorous and nitrogen loading to soils and waste water treatment plants.

Separating organics is one method of achieving landfill stability as outlined by the landfill organic stability initiative overseen by DNR. Even so, steps to encourage organic composting will require an examination of existing policy and regulatory barriers. Currently, a low-hazard exemption must be obtained to compost mixed food and food byproducts. This exemption is seen as a barrier to composting these organic materials.

(See next page for recommendations.)

C3. Recommendations to reduce and recover waste organics

Goal	To substantially increase the diversion of food residuals, food soiled paper, and clean wood, referred to here as “source-separated organics,” from disposal for composting or other productive use.
Objectives	<ul style="list-style-type: none">■ Identify contributors to source-separated organics in Wisconsin’s municipal solid waste.■ Develop and promote a hierarchy for recovery of source-separated organics.■ Identify and develop a strategy to reduce barriers to increase diversion of organics, including regulatory and policy issues, cost, infrastructure and markets.■ Initiate research into composting organics from commercial properties.
Recommendations	<p>C3.1. Identify sources of source-separated organics in Wisconsin’s municipal solid waste and promote education on options for reduction and diversion.</p> <ul style="list-style-type: none">■ In order to develop appropriate management strategies, conduct a study to identify contributors of food scraps to the municipal solid waste stream. Sources studied should include, but not be limited to, households, restaurants, grocery stores, food processors, and food distribution services.■ Develop educational programs on options for diversion. <p>C3.2. Initiate research into composting organics from commercial properties.</p> <ul style="list-style-type: none">■ Organics including food waste are being composted in many areas of the country. Research into the details of public health, practicality and cost of programs needs to be conducted to increase composting of organics from commercial sources.■ Research should include pilot implementation studies in five communities. <p>C3.3: Develop and promote a hierarchy for the recovery of source-separated organics.</p> <ul style="list-style-type: none">■ Possible components for the hierarchy include the following:<ul style="list-style-type: none">• Donation of edible food for human use• Food for animal feed• On-site composting - home or business• On-farm composting of off-farm materials• Co-composting of food residuals, yard materials & soiled paper• Energy recovery and biofuel production <p>C3.4. Identify and develop a strategy to reduce barriers and increase the safe diversion of source-separated organics.</p> <ul style="list-style-type: none">■ Attention should be paid to regulatory and policy issues, cost, infrastructure and markets.■ In particular, allow yard materials, food residuals and soiled paper to be co-collected and composted together, including on-farm composting.
<i>Action required by the DNR</i>	
<i>Action required by the DNR</i>	
<i>Action required by the DNR</i>	
<i>Action required by the DNR</i>	

C4. Recover more waste generated by commercial properties.

Background

Commercial waste is generated by restaurants, apartment buildings with five or more units, light manufacturing, retail, and other small businesses. The Wisconsin Statewide Waste Characterization Study (2003) revealed significant opportunities for business recycling. Municipal solid waste (MSW) generated by industrial, commercial and institutional sources was primarily comprised of 26% paper (including all types of fiber) and 20% other organic material.

Recent improvement has been made in recycling through the work of groups like WasteCap Wisconsin with difficult-to-recycle materials and Wisconsin Be SMART's work with festivals. New technology like single stream recycling may improve commercial recycling

because it makes recycling easier for the consumer by eliminating the need to sort recyclable materials. Enforcement and education are missing in many areas of the State, and people still seem confused about the recycling law and the requirements under their local ordinances. In many cases, there generally are no consequences for not recycling because of the lack of enforcement.

The Task Force is aware of a report on commercial recycling that is now being created by Recycling Connections Corporation for the DNR called "Commercial Recycling in Wisconsin - Beyond the Status Quo." The report is due to be finished early in 2007, and will contain recommendations for improving business recycling by responsible units (RUs) and for working with haulers and businesses to realize these improvements.

(See next page for recommendations.)

C4. Recommendations to recover more waste generated by commercial properties

Goal	To recover more material from commercial sources for reuse and to minimize the amount of commercial waste sent for disposal, as measured by the Wisconsin Statewide Waste Characterization Study (2003).
Objectives	<ul style="list-style-type: none">■ Increase the recycling of materials for which there are mandatory recycling requirements.
Recommendations	<p>C4.1: Increase education and information to Wisconsin businesses on what is required to be recycled.</p> <ul style="list-style-type: none">■ A new emphasis on mixed paper could be the catalyst to increase awareness of what is required to be recycled at home and at work. A more uniform list of accepted items to be recycled would avail itself to statewide advertising campaigns funded by the state recycling program.■ When the State corresponds annually with entities registered to do business in Wisconsin, notice should be provided of requirements for recycling by such business entities. The notice should further list items that are required to be recycled by State Law and local ordinance as well as a list of potential fines for noncompliance. <p>C4.2: Increase the effectiveness and enforcement of recycling ordinances through the development of business recycling plans.</p> <ul style="list-style-type: none">■ Any business registered with the State of Wisconsin should be required to develop a recycling plan designed to demonstrate how it will comply with local recycling ordinances. The business should be required annually to certify to the State and its RU the availability of such plan.■ RUs should be required to inspect at least a minimal number of business entities each year to confirm the existence of adequate plans. RUs should further have authority to enforce both the need for a plan and compliance with the plan.■ By the end of 2009, the DNR should adopt rules as necessary to establish this program and setting forth requirements for such business recycling plans. The DNR should further create and distribute a model plan format to assist business entities in achieving compliance.

Action required by the DNR, the Secretary of State's Office and/ or the Department of Revenue & stakeholders

Action required by the Legislature, the DNR & local units of government

C5. Re-examine the feasibility of a beverage container deposit law.

Background

Wisconsin currently has mandatory recycling requirements for aluminum, tin and steel cans, glass and No. 1 and 2 plastic containers. While this recycling requirement has been effective in reducing the percentage of these containers that are eventually landfilled, as many as half of the beverage containers generated in Wisconsin remain unrecovered through conventional recycling programs based on curbside and drop-off collection. Concerted efforts to increase recovery by improving conventional programs have met with minimal success in Wisconsin and elsewhere. Meanwhile, there has been a proliferation of these types of containers since the passage of Wisconsin's landfill ban. Other trends in the use of beverage containers are also occurring.

- A wide variety of new single-serving products are now packaged in aluminum, plastic and glass containers, including waters, ice teas and coffee-based beverages, fruit and fruit-type juices, wine and liquor-based beverages, and sport drinks.
- Because many of these items are in single-serving containers, they are often purchased and consumed away from home where a collection infrastructure (i.e., curbside collection) is less likely to be in place.
- Some products (e.g., beer) are switching away from the use of aluminum cans to forms of plastic that may be difficult to recycle.

One-time use beverage containers and other plastic and metal containers are disposed in Wisconsin landfills in increasing amounts as the use of these materials by the food and beverage industry expands. The Wisconsin Statewide Waste Characterization Study (2003) estimated that approximately 57,000 tons of aluminum and tin cans are landfilled



Beverage containers being sorted. Photo courtesy WM Recycle America.

annually. Similarly, plastics represented over ten percent of material being landfilled, or over 499,000 tons, with PET plastic bottles and other plastic container consisting of 2.4 percent of disposal volume.

DNR surveys have concluded that the recycling rate of banned recyclable containers may be approximately 40-70 percent. Recent statistics indicate the following percentages of materials are being recycled in Wisconsin:⁶

- Aluminum containers – 55 percent
- Steel containers – 54 percent
- Glass containers - 57-74 percent
- Plastic containers - 41-51 percent.

These rates are much lower than two neighboring Midwestern states that have beverage container deposit programs. Michigan reports a 95 percent return rate on containers covered by the state's container deposit bill, and Iowa reports a 92 percent return rate. All states with container deposit systems report recovery rates substantially higher than Wisconsin's.

⁶ "Recycling and Waste Disposal Trends" presentation by the DNR to the Task Force on August 31, 2005.

The DNR has also estimated the economic value of recyclables that are landfilled. For 2005, the agency estimated that aluminum cans valued at \$21 million and plastic containers valued at \$19 million were landfilled in Wisconsin. In addition to the direct economic loss, recovery and recycling of containers present other opportunities:

- Recycling of beverage containers conserves energy and natural resources. Failing to recycle one aluminum can wastes the energy equivalent of two ounces of gasoline in the production of a new can from new ore.
- Recycling of beverage containers provides a material for markets.
- Recycling of containers reduces the volume of material placed as waste in landfills.
- Most current beverage container materials do not degrade or decompose in landfills, and the resource is effectively lost forever.

Eleven states currently have container deposit, or “bottle bills” in place.⁷ The types of beverages covered by this legislation include beer, malt drinks, carbonated beverages, mineral waters, wine and liquor, and vary by state. The most comprehensive coverage is in Maine where all beverages are included

⁷ The eleven states that currently have bottle bills are Iowa, Michigan, New York, Connecticut, Vermont, Delaware, Massachusetts, Maine, California, Oregon and Hawaii.

except dairy products and unprocessed ciders.⁸ The deposit amount is also variable, but generally ranges from five to ten cents per container, although Maine has a higher deposit of 15 cents for wine and liquor containers. California’s container deposit is dependent on container size, where containers larger than 24 ounces require an eight cent deposit, and those smaller than 24 ounces have a four cent deposit.

States also have employed a variety of approaches to cover the costs of program implementation, including recognizing the cost to retailers. One example is Michigan, where unclaimed deposits revert to the state, wherein 75 percent of the money is deposited into the Cleanup and Redevelopment Trust fund, and 25 percent is returned to the retailers. Other states have adopted a formal handling fee targeted to the retailers that collect the returned containers.

Aluminum beverage containers represent a significant income to Wisconsin’s existing recycling centers. All of these recycling centers are designed, built and operated based on economics that include aluminum income (sometimes to subsidize less valued materials such as glass and plastic). It is important to realize that while a beverage container law in Wisconsin may be desirable, a transition into this new system will need to consider the existing investments.

⁸ There are proposals to expand the New York and Connecticut container laws to include noncarbonated beverages, including bottled waters and iced tea.

C5. Recommendations to re-examine the feasibility of a beverage container deposit law

Goal	To optimize the recovery of all types of beverage containers in order to save resources, energy, and minimize the disposal of these materials.
Objectives	<ul style="list-style-type: none">■ Determine the most effective program attributes and implementation plan for a beverage container deposit law that will work in Wisconsin with consideration of existing recycling programs and how these programs may change over time.■ Absent further evidence of higher recovery rates for beverage containers, adopt and implement a beverage container deposit program.
Recommendations	<p>C5.1: Determine the most effective program attributes and implementation plan for a beverage container deposit law that will work in Wisconsin in concert with existing recycling programs.</p> <ul style="list-style-type: none">■ Direct the DNR to conduct a study of existing and proposed beverage container laws in the U.S. This study shall include the amount of deposit, beverages and containers included, retailer requirements, and management of unclaimed deposits.■ The study should examine the impact on RUs and municipal refuse facilities to identify options that will not adversely affect the success of current programs or result in net additional costs to RUs.■ Direct the DNR to work in concert with other stakeholders (e.g., beverage companies, distributors, retailers, recyclers, and municipal governments) to identify key features of a deposit system that would work in Wisconsin in conjunction with existing recycling programs for other materials.■ Containers to be considered include the following:<ul style="list-style-type: none">• Aluminum• Glass• Plastic• Tin (i.e., tin-plated steel cans)• Steel■ Beverages to be considered for this legislation shall include:<ul style="list-style-type: none">• Carbonated• Bottled waters and mineral waters, including flavored and carbonated• Fruit and vegetable juices and juice products (i.e., less than 100 natural juice content)• Beer and malt beverages• Wine, including wine-based drinks• Liquor and spirits, including liquor-based drinks• Sports, energy, caffeine and related drinks• Tea, coffee and tea- and coffee-based drinks• Single-serving dairy products■ Direct the DNR to submit the results of the above study to the Legislature no later than July 2008.
<i>Action required by the DNR</i>	

C6. Conduct statewide waste generation and disposal studies at least every five (5) years.

Background

The DNR funded a comprehensive waste composition study in 2002. This study provided the most detailed information available of what is actually disposed of in landfills in Wisconsin. The results of the 2002 waste sort have allowed the Task Force to define current conditions in Wisconsin's management of solid waste and recyclable materials, pro-

vide a foundation of empirical data for deliberations and reveal opportunities for diverting materials from landfill disposal. The 2002 data also provide an opportunity to evaluate the success of future measures to increase recycling and diversion of valuable or harmful materials from Wisconsin landfills.

In light of the potential for additional changes in the characterization and composition of waste, relating to such things as new products, changing consumer habits and related matters, an accurate understanding of the solid waste stream is necessary to develop effective management policies.

C6. Recommendations to conduct statewide waste generation and disposal studies at least every five (5) years

Goal

Avoid significant, unexpected changes in the municipal solid waste (MSW) stream before management systems are in place to handle changes in a responsible manner.

Objectives

- Study the MSW stream to assure an accurate assessment of its composition over time.

Recommendations

C6.1: Mandate statewide waste generation and disposal studies every five (5) years.

Action required by the DNR

- The study should include waste going to both landfills and incinerators and waste from out-of-state sources.
- A frequency other than five years can be established if deemed appropriate by the DNR.

D. Promote Responsible Waste Disposal

Introduction

Here the Task Force focuses on steps that could be taken to improve regulation of construction and demolition landfills, and better address the external costs associated with long term maintenance of old landfills and the siting of new facilities.

D1. Enhance regulation of construction and demolition debris landfills.

Background

“Construction and demolition waste” refers to solid waste resulting from the construction, demolition or razing of buildings, roads and other structures.

Wisconsin law exempts landfills designed to receive only construction and demolition (C&D) wastes from certain design and operation standards that apply to landfills receiving a broader range of material. C&D landfills designed to receive fewer than 250,000 cubic yards, for example, are not required to obtain state licenses, report their waste volumes to the state, negotiate with their host communities under the landfill siting law, employ certified managers, or collect state disposal taxes. Small C&D landfills designed

to receive fewer than 50,000 cubic yards are further exempted from requirements such as constructing a base liner and multi-layer final cover, collecting leachate, gas venting, mandatory proof of the owner’s financial responsibility to maintain and close the site, and public notice prior to development.

Data and experience have called many of these exemptions into question. Department of Natural Resources studies suggest that liners and leachate collection are needed to prevent sulfate, manganese, chloride and other potential contaminants typically found in C&D wastes from reaching groundwater. Odor and the risk of gas migration from hydrogen sulfide released as gypsum decays are also concerns. Small C&D landfills have proliferated in some areas of the state as a low-cost alternative to recycling or disposal in more highly engineered sites. The state has little assurance that these sites are being used solely for inert C&D wastes.

In light of evolving waste management principles and goals, particularly the emphasis placed on waste minimization and reuse as well as a commitment to periodically evaluating ongoing waste management practices, the Task Force recommends an increased emphasis on materials recovery and reuse as well as revisions to the Administrative Codes that regulate C&D landfills.

D1. Recommendations to enhance regulation of construction and demolition debris landfills

Goal	Increase the protection of human health and the environment at construction and demolition (C&D) landfill sites and facilitate greater reuse and recycling of construction and demolition waste and materials.
Objectives	<ul style="list-style-type: none"> ■ Determine the extent to which C&D landfills may be impacting the environment. ■ Upgrade formal regulation of C&D landfills to minimize adverse environmental effects.

D1. (continued) Recommendations to enhance regulation of construction and demolition debris landfills

Recommendations

D1.1: Evaluate the extent to which C&D landfills may be adversely impacting the environment.

Action required by the DNR

- Direct the DNR to evaluate the performance of existing C&D landfills utilizing groundwater monitoring results from the State's database and determine if there are data gaps preventing a comprehensive evaluation.
- Direct the DNR to determine if safety or hazardous air emissions from C&D landfills (especially hydrogen sulfide gas) are a concern and if active or passive gas collection and flaring is needed at C&D landfills.
- Direct the DNR to determine whether siting, design, operation and monitoring standards similar to those found in Subtitle D of the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6941-49a (also known as the Solid Waste Disposal Act) should be applied to C&D landfills.
- Direct the DNR to determine if additional proof of financial responsibility for the closure and long-term care of C&D landfills is needed.

D1.2: Upgrade Administrative Code requirements for C&D landfills as appropriate.

Action required by the DNR

- Implement a review and licensing fee structure that is sufficient to allow proper oversight of C&D landfill operations by the DNR.
- Inspect C&D landfills at least annually.
- Track types and quantities of waste disposed of in C&D landfills and report to the DNR annually.
- Direct the DNR to review its C&D enforcement tools and recommend changes to ensure enforcement of C&D disposal restrictions on waste generators, transporters (both licensed and casual) and C&D site operators.
- Require that C&D waste destined for C&D disposal sites be segregated at the generation site from waste that should be sent to a licensed Subtitle D landfill. Segregation and processing should not take place at the disposal site unless the facility has a processing license.
- Eliminate the regulatory exemptions currently allowed for small sites (50,000 cubic yards or fewer). Establish uniform design and operation standards for all C&D landfills designed to receive fewer than 250,000 cubic yards of material. Maintain the one-time disposal alternative for non-landfill disposal as appropriate.
- Require certified facility managers who meet the state's training and experience qualifications for C&D landfills to be within 50 miles of the operating facility.
- Subject C&D landfills to the state fees and taxes imposed when equivalent waste streams are accepted at municipal solid waste landfills.
- Require waste screening to ensure only approved materials are disposed of in C&D landfills.
- Add unencumbered, recyclable metal (e.g., not encased in

D1. (continued) Recommendations to enhance regulation of construction and demolition debris landfills

concrete), treated wood posts, and drywall to the 14 materials banned from C&D landfills.

- Develop a means to notify C&D landfill customers of the types of waste that can and cannot be received at their facilities; containers for the segregation of C&D waste shall be clearly marked.

D2. Assure adequate financial assurance by landfill operators.

Background:

The broad goal of owner financial responsibility is to protect the State from future environmental liabilities related to the management and ultimate disposal of solid and hazardous waste. In most cases, financial assurance is required to provide adequate resources to do physical work that's necessary to ensure proper functioning of waste management and disposal facilities, both active and closed. Proper management translates into reduced liability.

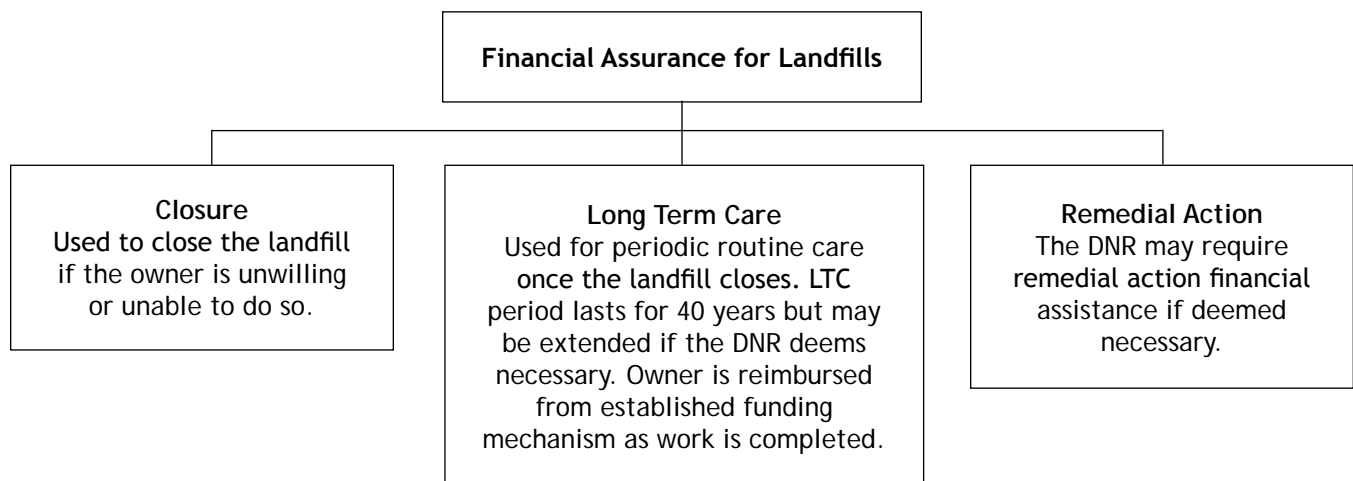
There are three primary types of financial assurance required for Wisconsin landfills. They include closure, long term care and remediation (see Figure 7.1).

Description of Financial Assurance Types

Closure

Almost all currently licensed solid waste landfills are required to provide proof of financial responsibility for closure. In addition, the DNR may require proof of financial responsibility for small size construction and demolition waste landfills and for non-landfill facilities such as tire storage or processing facilities, contaminated soil processing facilities, and recycling facilities. The facility must provide proof of financial responsibility to cover the costs to close the facility according to the closure requirements in the approved plan of operation and the requirements of s. NR 520.07(2), Wis. Adm. Code, for solid waste facilities. Proof of financial responsibility for closure must be established prior to receiving an initial license and maintained during the entire operating life of the facility, until the point at which the DNR

Figure 7.1: Types of Financial Assurance for Landfills



approves final closure documentation and notifies the facility that financial responsibility for closure is no longer necessary.

Long-term Care

In addition to proof of financial responsibility for closure, almost all currently licensed solid waste landfills are also required to provide proof of financial responsibility to cover costs associated with long-term care of the facility according to the long-term care requirements in the approved plan of operation and the requirements of s. NR 520.07(3), Wis. Adm. Code. Newly-licensed operating landfills are required to provide proof of financial responsibility for long-term care annually during the operation to cover a period of 40 years after the closing of the facility. The DNR may extend the long-term care period beyond 40 years, however, if it determines that it is necessary to protect human health or the environment. Specific requirements for non-approved and older closed landfills may vary. Facilities with long-term care

financial responsibility may request reimbursement for long-term care costs incurred beginning one year after the facility's closure documentation has been approved and each year thereafter. If the owner is unable to perform long-term care, the DNR may use the resources in place to perform the work.

Remedial Action

Wisconsin does not require operators to provide financial assurance for unforeseen remedial costs until and unless a problem requiring remediation is discovered. Once remediation has been determined to be necessary, owners of municipal solid waste landfills which accepted waste after July 1, 1996, may be required by the DNR to provide proof of financial responsibility for remedial actions.

The DNR has convened a workgroup to examine these and other financial assurance issues.

D2. Recommendations to assure adequate financial assurance by landfill operators

Goal	Ensure that the owner financial responsibility system, on both a short and long-term basis, is protective of the environment, and minimizes liability to the citizens of the State of Wisconsin.
Objectives	<ul style="list-style-type: none"> ■ Identify an appropriate long-term care period based on design and operating parameters for any given landfill. ■ Revise financial assurance mechanisms to assure that funding will be available for future care and remediation without cost to state taxpayers.

D2. Recommendations to assure adequate financial assurance by landfill operators

Recommendations

Action required by the DNR with input from stakeholders

D2.1: Define a period for proof of financial responsibility consistent with how long funding should be available for long-term care based on design and operating parameters.

- Increasing attention is being given to whether a 40-year long-term care period is appropriate, and to the use of performance measures, such as organic stability, in identifying long-term care needs. A reasonable long-term care period should be established taking into account design and operating parameters for any given landfill.

Action required by the DNR

D2.2: Provide for accessible and reliable remediation coverage for active and closed sites.

- Concerns have been raised as to whether the potential need for remediation at operating and closed sites. Wisconsin does not require landfills to provide proof of financial responsibility for remedial costs until and unless a remedial need is identified. Instead, landfill operators collect a tipping fee of \$0.50 cents a ton for municipal solid waste and \$0.20 cents a ton for other wastes to provide for remediation of facilities at which a responsible party is unavailable, unable to unwilling to pay. State-incurred expenses at such landfills have historically been far less than fees collected from landfills for this purpose.
- A comprehensive analysis of both that history and emerging trends that could affect future remedial needs is needed in order to identify any changes required to better manage the state's potential risks.

Action required by the Legislature & the DNR

D2.3: Evaluate alternative means, such as a state insurance pool, of providing for long-term care and/or remediation at landfills.

- The cost of such alternatives should not be borne in any way by state taxpayers.

Action required by the DNR

D2.4: Ensure uniform enforcement of current and future requirements for financial assurance.

- The DNR estimates that 16 closed and operating landfills are not in compliance with current law requiring landfills to regularly update their cost estimates and corresponding financial assurance. The DNR should explore requiring updated cost estimates as a condition of renewing a facility's annual license.

Action required by the Legislature & the DNR

D2.5: Eliminate the net worth option as a financial assurance mechanism.

- Financial conditions within a company can change too rapidly. The DNR needs more than a balance sheet to assure that funding will be available for closure, long term care, or remedial action if the need arises.

Action required by the DNR

D2.6: Evaluate whether cost estimates used by the DNR in financial assurance calculations are adequate to assure the availability of funds when the need arises and, if not, implement necessary changes.

D3. Revise the waste facility siting process.

Background

The local role in landfill siting in Wisconsin is specified in Section 289.33, Wis. Stats. A local siting committee is formed to negotiate terms of siting with the landfill developer. The local siting committee typically consists of four (4) members from the town (two of which must not be elected officials or municipal employees), two (2) members from the county, and one (1) member each from any other affected municipalities.

The local siting committee has the responsibility to negotiate terms of siting but does not have the authority to deny siting. Siting committee meetings are open meetings under Wisconsin law therefore public input is authorized under the siting law. If the local siting committee successfully negotiates the terms of siting, they send a written negotiated agreement to the governing bodies of the municipality where all or a portion of the facility is located (assuming they participated in negotiations), with the exception of the county.

If the governing bodies approve the agreement, it is binding on all the municipalities, but if any governing body does not approve the agreement, the agreement is void. If the negotiating committee fails to successfully negotiate an agreement, the issue may be submitted to the Waste Facility Siting Board (WFSB) for arbitration.

During several Task Force meetings, the public was invited to present issues of concern. Several speakers expressed concern about the apparent lack of public participation in siting committee appointments and deliberation.

Other statutory provisions affecting landfill siting in Wisconsin include the determination of need for the landfill,⁹ and a planned site life limitation of 15 years for landfills.¹⁰ The needs determination is intended to prevent the undue proliferation of landfills in Wisconsin. The site life limitation is intended to ensure that designs incorporate up-to-date technology and comply with reasonably current standards for siting, design, construction, and operation.

⁹ Section 289.28, Wis. Stats.

¹⁰ Section 289.29(1)(d), Wis. Stats.

D3. Recommendations to revise the waste facility siting process

Goal

To improve public participation in the process for siting of municipal solid waste landfills and to clarify the DNR's role in the needs analysis.

Objectives

- Improve public participation in the local siting committee process.
- Educate the public on roles of the siting committee and the local governmental body.
- Strengthen the DNR's ability to ensure up-to-date technology if a landfill's life exceeds 15 years.
- Determine whether the needs analysis can be streamlined and made more effective.

D3. (continued) Recommendations to revise the waste facility siting process

Recommendations

*Action required by
the Legislature*

D3.1: Ensure adequate and representative public participation in the local siting committee process.

- Prior to forming a local siting committee, public notice by municipalities and counties adopting a siting resolution should be made requesting interested parties to submit their interest and qualifications to be on the committee. Then, a meeting with public input should occur to review the candidates and make the selection of members.
- The public should be afforded the opportunity to address the local siting committee periodically during the negotiation process.
- Modify requirements for the composition of the local siting committee to include at least one person that lives within one-half mile from the proposed landfill property limits or lives along a potential waste truck route to the landfill (unless no one who meets these requirements is willing to serve on the committee or if this requirement is waived by the WFSB).

*Action required by
the Waste Facility
Siting Board*

D3.2: Educate the public on roles of the siting committee and the local governmental body.

- Once the local siting committee is formed, training should be provided to the committee members as to their responsibility and their limitations of authority.
- Periodically the local siting committee's responsibility authority and progress should be announced to the public so the public is aware of the status of negotiations.
- Soon after selection of the local siting committee members, public education should occur via an informational brochure sent to the homes of all residences and businesses located within one mile of the proposed landfill. This brochure should include a copy of siting laws, committee responsibility, contact information, and the opportunity for public comment.

*Action required by
the DNR*

D3.3: Study whether the needs analysis can be streamlined and made more effective.

- The DNR should review the needs analysis and determine whether assumptions made during the analysis can be streamlined or made more effective, and consistent decision criteria can be applied, so that the DNR can make better decisions regarding the need for the proposed landfill.

*Action required by
the DOA, the WFSB &
stakeholders*

D3.4: Study the standing of participants in the landfill siting process to ensure that affected municipalities (town, city, village and counties) have adequate ability to have their needs and impacts addressed.

E. Promote Ecological and Environmental Sustainability

Introduction

Sustainability has to do with the long-term future of Wisconsin and the world that we leave for future generations. Here, the Task Force proposes measures to deal more effectively with toxic wastes, used oil filters, and unused pharmaceutical products and then turns to policies relating to state purchases of products made from recycled materials.

E1. Expand the disposal ban to other domestic and agricultural universal wastes.

Background

Wisconsin currently requires regulated businesses to recover several commonly used materials, restricting their disposal because of the potential toxic nature of the products or certain components. Referred to as universal wastes, these include:

- Used lamps¹¹

¹¹ Includes used lamps as defined by U.S. Environmental

- Used batteries (lead acid, rechargeable)¹²
- Used mercury devices and mercury liquid less than one pound¹³
- Pesticides¹⁴
- Used antifreeze (ethylene and propylene glycol)¹⁵

There is no similar requirement in Wisconsin for residential or agricultural waste generators to recover these materials from the solid waste stream. Consequently, this waste stream is contributing mercury, cadmium, lead and other toxic materials to the state's environment. Recently, California implemented a program to ban universal wastes from landfills, regardless of the source of the material. Other states are also examining similar bans.

(See next page for recommendations.)

Protection Agency (EPA) regulations published in 40 CFR 273.9.

¹² Includes used batteries as defined by EPA regulations published in 40 CFR 273.9.

¹³ Includes mercury devices as defined by EPA regulations published in 40 CFR 273.9.

¹⁴ Includes pesticides as defined by EPA regulations published in 40 CFR 273.9.

¹⁵ Includes used antifreeze as defined by Wisconsin Department of Natural Resources (DNR) guidance published as WA 356-03.

E1. Recommendations to expand the disposal ban to other domestic and agricultural universal wastes

Goal	To eliminate the movement of residential and agricultural universal waste (and the toxic materials and potential resources they contain) into landfills, incinerators, and Wisconsin's environment.
Objectives	<ul style="list-style-type: none">■ Update the administrative code to ban universal waste from landfills for all generators.■ Communicate the reason for the new requirements to residential and agricultural generators of universal waste.■ Support the establishment of accessible recovery facilities.■ Expand the Department of Natural Resources (DNR's) citation enforcement authority for universal waste.
Recommendations	<p>E1.1: Update the statutes and Administrative Code to ban universal waste from landfills and incinerators for all generators.</p> <ul style="list-style-type: none">■ The Legislature should require the DNR to expand the regulation of universal waste to cover all generators, including residential and agricultural sources.■ The DNR should evaluate and adopt effective inspection and/or enforcement mechanisms. <p>E1.2: Communicate the reasons for new requirements to residential and agricultural generators of universal waste.</p> <ul style="list-style-type: none">■ The DNR and the UW-Extension should expand guidance on the new proposed regulations to residential and agricultural generators.■ The DNR should work with private and municipal solid waste handlers in developing a communications program to generators. <p>E1.3: Support the establishment of accessible recovery facilities.</p> <ul style="list-style-type: none">■ The DNR should assist responsible units (RUs) to utilize existing collection locations and services where possible and to encourage the establishment of permanent collection facilities accessible to all residents of the state.■ The DNR should collaborate with manufacturers on the potential development of manufacturer take-back (i.e., extended producer responsibility) programs.■ The DNR should work with RUs to expand the collection of universal wastes, with the costs of this service to be covered by state cost sharing, including fees on the sales of universal waste products. <p>E1.4: Expand the DNR's citation enforcement authority for universal waste.</p> <ul style="list-style-type: none">■ The Legislature should expand the DNR's citation enforcement authority to include universal waste management violations.
<i>Action required by the Legislature & the DNR</i>	
<i>Action required by the DNR & UW-Extension</i>	
<i>Action required by the DNR & RUs</i>	
<i>Action required by the Legislature & the DNR</i>	

E2. Ban the disposal of used oil filters and oil absorbent materials.

Background

With the advent of Wisconsin's recycling law most components of oil filters (steel, paper and waste oil) were effectively banned from landfills. Oil filters themselves, however, are not covered by this law.

Oil in landfills may increase the level of volatile organic compounds (VOC) in leachate and air emissions. Excess VOCs in leachate may increase costs associated with treatment at wastewater treatment facilities. When released to the air, VOCs can cause local human health issue and negatively impact air quality on a global scale. If free-flowing oil escapes into the ground or surface waters, it can cause harm to human and animal health and the ecosystems in which they live.

In 2003, approximately 9.4 million light and heavy duty oil filters, as well as two million diesel engine fuel and coolant filters, were used in Wisconsin.¹⁶ Of this total only about 2.8 million were recycled. The remaining millions were sent to landfills or incinerators for disposal, with an estimated 860,000 gallons of oil disposed of along with the filters.

Used oil absorbents also contain a large volume of waste oil. It is estimated that 8 to 10 times as much oil is landfilled in absorbents as in oil filters (6,880,000 - 8,600,000 gallons).¹⁷ The average volume of oil absorbents used each year in Wisconsin

is approximately 54.6 million pounds, with only 1.3 million pounds recycled.

Recognizing issues associated with used oil filters and absorbents, the Legislature passed 2003 Wisconsin Act 96, which directed the Department of Commerce to convene a diverse committee of stakeholders to investigate, study and make recommendations for improving the management of used oil filters and oil absorbent materials.

The committee subsequently compiled these recommendations as follows:

- a. "...that a recycling goal of 60 percent be established for used oil filters, to be reached either within two years after the goal is established or by July 1, 2008, whichever comes first; and if that goal is not met by then, a total landfill ban – from both commercial and residential generators – should be enacted."
- b. "...that the following progressive series of recycling-rate goals be established for major commercial generators of used oil-absorbent materials, with enactment of a landfill ban at any of the deadlines at which a rate goal is not achieved: 10 percent by July 1, 2008; 20 percent by July 1, 2010; 30 percent by July 1, 2012; and 40 percent by July 1, 2014. Any facility that uses more than 500 pounds of oil-absorbent materials in any one-month period is considered to be a major commercial generator."

(See next page for recommendations.)

¹⁶ *Disposal of Oil Filters and Other Oil-Absorbent Materials in Wisconsin*, Department of Commerce (June 2005).

¹⁷ *Id.*

E2. Recommendations to ban the disposal of used oil filters and oil absorbent materials

Goal	To reduce the amount of used oil sent for disposal in landfills and incinerators.
Objectives	<ul style="list-style-type: none">■ To reinforce and underscore the findings of the Department of Commerce June 2005 report by requiring a mandatory ban of all used oil filters and oil absorbents prior to the dates set forth in the previously mentioned findings.
Recommendations	E2.1: Enact a landfill ban on used oil filters and other oil-absorbent materials incorporating the dates noted in the recommendation from the Department of Commerce. <ul style="list-style-type: none">■ Continue to engage the authors and co-sponsors of SB 121 so as to ensure this issue is placed on the Legislature's agenda.■ Work with waste oil and oil absorbent recyclers to develop an economically sound mechanism by which an infrastructure may be developed.■ Establish an advance disposal fee for oil filters/absorbents, using monies to establish a grant program to assist local municipalities initiate a used oil filter and oil absorbent recycling programs.■ Require the DNR and the Department of Commerce, along with used oil filter/absorbent recycling firms, to work with high volume users of both oil filters and oil absorbents to establish recycling programs.■ Use the collective efforts of solid waste and recycling groups and appropriate vehicle industry groups to develop informational and educational programs.
<i>Action required by the Legislature, the DNR & stakeholders</i>	

E3. Develop and adopt a responsible mechanism to dispose of unused pharmaceuticals.

Background

Unused pharmaceuticals are generated, sometimes in significant quantity, whenever individuals do not take all of a prescribed medication. Traditionally, individuals were told to flush unused

pharmaceutical waste down the toilet. Recently, endocrine disrupters and other pharmaceuticals have been found in water. One source is flushed pharmaceuticals. The significance and effects of flushed pharmaceuticals are unknown. Pharmaceuticals can be included in household hazardous waste collections if proper law enforcement participation is included.

(See next page for recommendations.)

E3. Recommendations to develop and adopt a responsible mechanism to dispose of unused pharmaceuticals

Goal	To reduce the levels of endocrine disruptors and other pharmaceuticals in the environment.
Objective	■ To provide a responsible way to dispose of unused pharmaceuticals.
Recommendations	E3.1: Until a Federal solution is enacted, Wisconsin should research and develop a responsible mechanism to recover and dispose of unused pharmaceuticals.
<i>Action required by the DNR, stakeholders & the Legislature</i>	<ul style="list-style-type: none">■ The DNR should conduct or contract for research as follows:<ul style="list-style-type: none">a. Evaluate the relative size of contributors of pharmaceuticals to Wisconsin's water. Potential contributors include flushed unused pharmaceuticals, used pharmaceuticals that passed through the body, industrial sources, and agricultural waste.b. Determine the sources and quantities of endocrine disruptors and other pharmaceuticals in Wisconsin's water. If possible, also determine projected quantities.c. Evaluate the effects of current and projected quantities.d. Examine options for collection, including the feasibility of producer take-back and deposit-return systems.■ The DNR and Department of Justice should facilitate the education of, and cooperate with, law enforcement officials on proper management of unused pharmaceuticals.■ If the results of research indicate that unused pharmaceuticals are a significant contributor to the problem, develop a program to educate the public on issues associated with unused pharmaceuticals and, eventually, options for collection and disposal.■ Identify and implement strategies to eliminate or minimize the impact of unused pharmaceuticals. This should be accomplished during the study timeframe described above and as a partnership effort among the appropriate state agencies and pharmaceutical manufacturers.■ Advocate that the Federal Drug Enforcement Administration, in cooperation with state partners, allow reverse distribution of pharmaceuticals via US Postal Service mail.

E4. Develop appropriate restrictions on open burning and on-site burying.

Background

Backyard disposal practices take on two primary methods: open burning and on-site burying. Open burning is the number one source of:

- Citizen complaints to the DNR about air pollution;
- Uncontrolled dioxin emissions;
- Wildfires in Wisconsin forests.

Disposal of waste generated from a single family residence is entirely exempt from regulation under state law as long as it is “disposed” of on the same property on which it was generated. Due to the “same

property as generated” exemption for disposal of single family waste, therefore, it is legal to bury one’s garbage in one’s own backyard or “back 40.”

Under state law, waste combustion is defined as “incineration,” a type of “solid waste treatment” and not “disposal.” Therefore, burning solid waste from a single family residence is not exempt from state regulation. In addition, it is illegal to burn wet combustible rubbish, garbage, oily substances, asphalt, plastic, rubber or treated or painted wood. It is also illegal to burn paper and cardboard that has been separated for recycling. It is legal, however, to burn dry grass, leaves, brush and non-recyclable paper and cardboard products on the property on which they are generated.

E4. Recommendations to develop appropriate restrictions on open burning and on-site burying

Goal	To reduce contamination to the environment by the uncontrolled disposal of household waste by burning and disposal on one’s own property.
Objective	<ul style="list-style-type: none"> ■ Restrict the disposal of household solid waste on one’s own property including steps to phase out burning of household solid waste, burying garbage in one’s own backyard, and improving state and local enforcement of those laws
Recommendations	E4.1: Authorize the DNR to issue citations for open burning consistent with current law including specific forfeitures and fines for first and subsequent offenses.
<i>Action required by the Legislature</i>	<ul style="list-style-type: none"> ■ This provision should have a delayed effective date to allow for public education efforts and it should specify a minimal forfeiture for first offenses related to household waste.
<i>Action required by the DNR</i>	E4.2: Promote a burn barrel education effort.
<i>Action required by the Legislature</i>	E4.3: Phase out the statutory exemption that prevents regulation of household waste disposal on one’s own property.
<i>Action required by the DNR</i>	E4.4: Phase out exemptions in the DNR’s solid waste and air management programs that allow households to open burn certain solid waste.

E5. Require state purchasing practices to favor products generated from recycled materials and to promote recycling by vendors.

Background

The State of Wisconsin, including agencies and the University of Wisconsin system, purchase a variety of goods and services each year. Some procurement is the direct purchase of paper, packaging and other materials, while other purchases are for services where materials are consumed or incorporated into structures (e.g., highway construction, buildings, etc.).

The State has the opportunity to serve as an example by purchasing recycled products and providing a demonstration of the best and most practicable means of purchasing materials that have a high percentage of recycled content. Potential examples include, but are not limited to:

- Paper
- Packaging (including paperboard, cardboard,

wood, metal, glass and plastic)

- Furniture
- Construction materials (e.g., recycled concrete and asphalt, steel).

Wisconsin also has significant economic activity in those industries that would benefit by having an increased market for recycled materials, both within Wisconsin and nationwide. These include:

- Pulp and paper
- Packaging
- Wood products
- Printing.

Development of new products containing recycled materials (or a higher percentage of recycled materials) could create opportunities for Wisconsin business, both in new markets and reduced raw materials and energy savings. Reduced utilization of Wisconsin's natural resources and raw materials may be a secondary benefit.

E5. Recommendations to require state purchasing practices to favor products generated from recycled materials and to promote recycling by vendors

Goal	To increase the purchasing and use of recycled materials by the State of Wisconsin and create new market opportunities for Wisconsin business.
Objectives	<ul style="list-style-type: none">■ Support the development and utilization of recycled materials by increasing the purchasing of recycled products by the State of Wisconsin.■ Give preference in state purchasing for services to those companies that utilize recycled materials as part of their services.■ Support the development of recycled products by Wisconsin companies.■ Increase deconstruction evaluations and subsequent deconstruction components in state demolition contracts.■ Require state agencies and the University of Wisconsin System to evaluate their purchasing and waste management practices.
Recommendations	<p>E5.1: Support the further development and utilization of recycled materials by requiring the purchasing of recycled products by the State of Wisconsin where suitable.</p> <ul style="list-style-type: none">■ Direct the Departments of Natural Resources (DNR), Administration and Commerce to perform a joint study identifying currently available recyclable products that the State may utilize, and opportunities for the State to support development of new products. This study shall be provided to the Legislature no later than 12 months after this recommendation is put into effect.■ Studies should address the concern that materials originating from out of the country be pest free.■ Direct the DNR and the Department of Administration to develop model recycled purchasing legislation for submittal to the Legislature no later than 12 months after this recommendation is put into effect.■ The Legislature should thereafter adopt legislation requiring the State of Wisconsin and University of Wisconsin System to purchase products manufactured with recycled materials when these are available at a competitive cost. <p>E5.2: Give preference in state purchasing for services to those companies that utilize recycled materials.</p> <ul style="list-style-type: none">■ Direct the Department of Administration, working in conjunction with the Departments of Natural Resources and Commerce, to perform a study identifying how state purchasing policies for services could incorporate preference for use of recycled materials. This study shall be provided to the Legislature no later than 12 months after this recommendation is put into effect.■ Direct the Department of Administration to develop model legislation based on the above study.■ The Legislature should thereafter adopt legislation requiring the State of Wisconsin and University of Wisconsin System to give

Action required by the DNR, the DOA & the DOC

Action required by the DNR, the DOA, the DOC & the Legislature

E5. Recommendations to require state purchasing practices to favor products generated from recycled materials and to promote recycling by vendors

preference to purchased services where recycling is a factor in the services provided.

E5.3: Support the development of new recycled products and high-recycled content products by Wisconsin companies.

Action required by the DNR & the DOA

- Direct the Departments of Commerce and Natural Resources to work in collaboration with state and national industry groups (e.g., Wisconsin Paper Council) in identifying potential market opportunities for new recycled and high-recycled-content products.
- The Legislature should support targeted funding for collaborative research by the University of Wisconsin System and Wisconsin businesses in the development of recycled products.

E5.4: Increase deconstruction evaluations and subsequent deconstruction components in state demolition contracts.

Action required by the DNR & the DOA

- Direct the DNR to update deconstruction standards and related information to other state agencies, local government and construction and demolition industry associations on a regular basis.
- Direct the Department of Administration to require deconstruction evaluations to be incorporated into state construction projects where appropriate.

E5.5: Require state agencies and the University of Wisconsin System to give special consideration to vendors offering take-back programs and to evaluate their waste management practices in general.

Action required by the DOA

- The Department of Administration should establish a state procurement program wherein state agencies and the University of Wisconsin System require manufacturers and/or distributors to take back or otherwise be responsible for the proper recycling or disposal costs of products containing toxic materials and resource or energy-rich items.
- Request the Department of Administration to direct agencies and the University of Wisconsin System to evaluate their waste management programs on an annual basis for best practices regarding purchasing, waste reduction, re-use, recycling, composting, landfilling, and waste-to-energy.

The Task Force has identified other issues of concern or opportunity and recommends further study and consideration of the following issues by the Department of Natural Resources (DNR) and stakeholders.

A. Single Stream Recycling

The Task force has generally focused on issues of policy as opposed to the details of implementation. Indeed, our general view is that implementation decisions are best made at the responsible unit of government (RU) level, where local concerns, opportunities, and practical considerations can be addressed. As such, we generally have not recommended specific measures on topics such as waste collection and segregation for recycling.

Even so, we recognize the approach advocated by some known as “single stream recycling,” the primary focus of which is to make it easier for residents to recycle more material and to minimize the cost of collection in doing so. By definition, single stream recycling allows the collection of mixed recyclables in a single container. Recyclable paper, glass, plastic, steel and aluminum can all be mixed in one container. Carts can be picked up using automated technology that enables the material to be stored in one compartment of a truck. The processing of single stream material at the recycling center utilizes separation technology specifically designed for this mixed recyclable stream.

In Wisconsin, most communities have been utilizing dual stream systems where paper items are required to be kept separate from bottles and cans. While many dual stream programs are very effective, increases in recycling rates might be achieved by switching to single stream technology. Indeed, single stream seems to be gaining popularity nationwide because of the apparent success of certain large-scale programs.

In earlier days, single stream was somewhat con-

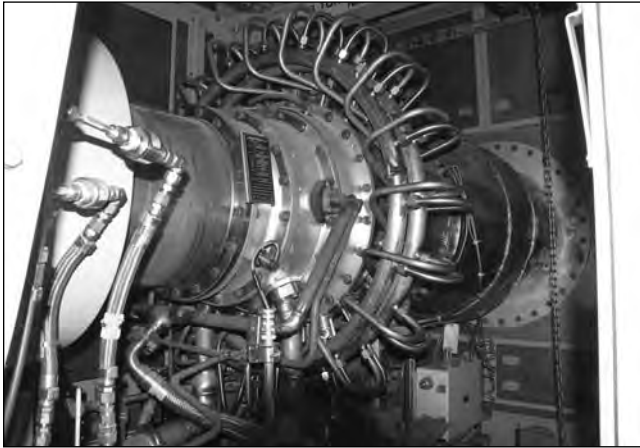
In this section

- A** Single Stream Recycling
- B** Agricultural Plastics
- C** Resource Recovery through Waste-to-Energy Incineration
- D** Emerging Technologies

troversial because some facilities produced poor quality materials for recycling. Today, according to some single stream operators, single stream technology produces grades of recyclable materials with quality better than dual stream technology. By contrast, however, some domestic recycle paper mills argue that the quality of fiber recovered from single stream systems is generally not equal to that recovered from dual stream systems.

Automated collection systems are another potential benefit of single stream programs. Collection carts are designed for trucks equipped with hydraulic arms and the cart system has less hand contact with the collected materials. The driver stays in the truck and does no manual lifting. Drivers may be able to collect from more homes each day, increasing certain labor efficiencies and potentially reducing costs. On the other hand, costs may increase for processing and usage of the materials collected if sorting systems after collection are not effective and efficient.

Single stream has the potential to improve community disposal diversion rates. The Task Force supports further study of this issue by the DNR and responsible units of government to evaluate impacts on the quality of recycled materials and the potential for application at the local level as appropriate. The parameters of this issue would also become clearer after an analysis of costs as set forth in Recommendation A1.



A close-up look at one of two co-generation turbines that provide green energy to SC Johnson's Waxdale manufacturing facility in Sturtevant, WI. The turbines reduce greenhouse gas emissions by 52,000 tons per year. Photo courtesy SC Johnson.

B. Agricultural Plastics

Plastic is ubiquitous and increasingly used in agriculture, both in the delivery of goods and for wrapping crops and materials. Other than pesticide containers, for which a national solution is emerging through the Agricultural Container Recycling Council, farmers generally have no access to recycling for "ag plastics." In fact, many farmers rely on open burning to eliminate waste plastics.

The Task Force supports further study of this issue by the DNR and the Department of Agriculture, Trade & Consumer Protection. Pilot projects to evaluate the cost-effectiveness of producer take-back and deposit-refund systems might be appropriate.

C. Resource Recovery through Waste-to-Energy Incineration

Wisconsin has two municipal solid waste-to-energy (WTE) systems, one being a refuse-derived fuel system in La Crosse County and the other being a mass burn system in Barron County. Although more common several decades ago, many of the systems have been closed due to a combination of the costly upgrades of pollution control systems and the availability of less expensive landfills.

Recently in Minnesota, Washington, New York, and California there is renewed interest in WTE. This may be attributable to a variety of reasons, including such things as increased energy costs, global warming, widespread operation in Europe, relatively low air emissions, safe management and reuse of ash, stagnating recycling rates, and objections to land disposal.

The Task Force supports further consideration of waste-to-energy options as appropriate for Wisconsin. The parameters of this issue would also become clearer after an analysis of financial and environmental costs as set forth in Recommendation A1.

D. Emerging Technologies

The Task Force received several comments recommending consideration of new technologies for the management of solid waste. One such technology would purportedly create energy (ethanol and electricity) from MSW, sewage sludge, used tires, plastics, paper, forestry and agricultural wastes. Wastes would be gasified at a temperature of 2,200 degrees F to create a syngas (CO, H₂ and some CO₂). The syngas would be cooled and fed into a bioreactor where bacteria catalyze the gases directly into ethanol. The Task Force was advised that residuals from the process are clean water and vitrified solids with an economic payback allegedly on the order of a few years.

Another technology, called "plasma arc waste disposal," would use high temperatures (over 10,000 degrees Fahrenheit) to vaporize waste and produce an inert silicate material for use in road-building and construction projects. The process is purportedly sustainable from an energy perspective because recovered gasses produce three times as much electricity as they consume.

The Task Force has formed no opinions about the merits of these proposals much less their financial viability. It would make sense, however, to monitor developments in emerging technologies so that alternatives can be considered if and when it seems appropriate to do so.

9

Conclusions

There are many challenges to come. This report does not, for example, explain exactly how you convince an individual home or business owner to separate each and every piece of paper or plastic for recycling instead of disposal. It does not offer a step-by-step process to assure that every scrap of organic waste is composted instead of landfilled or incinerated.

Instead, it describes steps to achieve a coordinated system to reduce waste generation in the first place, recover what can be re-used in a fashion that is economically viable thereafter, and dispose of the rest in a manner that minimizes effects on human health and the environment. The system we discuss lies generally at the policy level, a framework to be established by rules and regulations. Where there exists a need for uniform statewide policies and procedures, for example, steps should be taken by the Legislature and appropriate state agencies for implementation purposes. Otherwise, policies should be set and enforced by responsible units of government at the local level. Indeed, working within the parameters of state policy and county solid waste plans, the responsible units of government are in the best position to balance local concerns, opportunities, and practical considerations associated with waste handling and collection. Overall, of course, the Task Force believes that actions should be guided, whenever possible, by an objective look at true social and economic costs.

The implementation of these recommendations will require a coordinated approach involving stakeholders, the Department of Natural Resources, legislators and the Governor. A useful “next step” might be to form a “Waste Minimization, Re-

covery and Disposal” study group appointed by the DNR Secretary and reflecting membership among a broad group of agency representatives, stakeholders, and possibly legislators. Such a group, whether formally constituted by legislation or not, could assist in mapping a prompt and considered course of action taking the recommendations in the report from theory to practice. Changes certainly will be required as issues fluctuate, but a coordinated effort to develop and marshal the steps necessary to implement these recommendations would seem to offer the best chance to make the integrated system reflected in this a report a reality.

Simply put, the objective is to move towards ecological and environmental sustainability through a series of complementary actions designed to minimize waste generation, maximize the recovery of resources where economically viable, and dispose of the rest by means that protect human health and the environment, simultaneously working to minimize total financial, social and environmental costs. Our vision for Wisconsin, therefore, can be stated as follows:

In a manner designed to minimize environmental, economic, and social costs to the residents of Wisconsin and beyond, the State of Wisconsin shall achieve and maintain an integrated materials management system consisting of enhanced producer responsibility for products, effective resource recycling and recovery, and responsible waste disposal – all designed to promote ecological and environmental sustainability.

Respectfully submitted this 28th day of December 2006 by the members of the Governor's Task Force on Waste Materials Recovery and Disposal.

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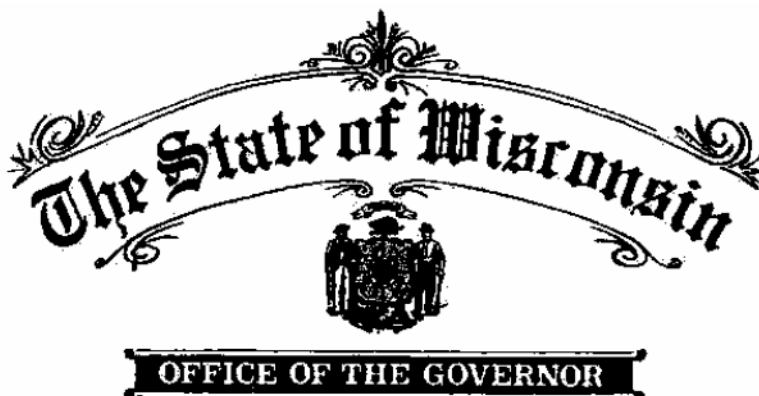
Gary Zajicek

Veridian Homes



Appendices

Appendix A: Executive Order #106 (June 14, 2005)



EXECUTIVE ORDER # 106

Relating to the Creation of the Governor's Task Force on Waste Materials Recovery and Disposal

WHEREAS, Wisconsin's citizens, businesses, industries and municipalities depend on the proper management of wastes to protect human health and the environment, ensure continued economic development and to promote the welfare of future generations; and

WHEREAS, Wisconsin's solid waste policy statute acknowledges that "maximum solid waste reduction, reuse, recycling, composting and resource recovery is in the best interest of the state in order to protect public health, to protect the quality of the natural environment and to conserve resources and energy;" and

WHEREAS, failure to maximize the productive use of waste materials represents an inefficient use of society's resources that leads to increased economic and environmental costs affecting all citizens of the state; and

WHEREAS, Wisconsin has a proud tradition as a national leader in the recovery of high-volume industrial byproducts, in the recycling of consumer materials such as paper, aluminum, glass and plastic, in the composting of yard waste and in the development of solid waste management standards; and

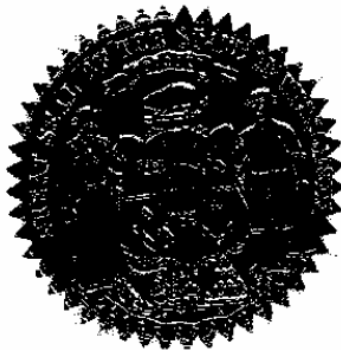
WHEREAS, Wisconsin is encountering challenges to improving on its successful recycling and waste management record, including the advent of new waste streams and changes in consumption habits; and

WHEREAS, landfilling of solid wastes as practiced today in Wisconsin and the rest of the nation poses potential burdens for future generations; and

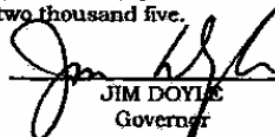
WHEREAS, wise lands use principles require that Wisconsin achieve a reasonable balance between waste generation and disposal requirements and the development of disposal capacity;

NOW, THEREFORE, I, JIM DOYLE, Governor of the State of Wisconsin by the authority vested in me by the Constitution and the Laws of this State, and specifically by Wis. Stat. § 14.019, do hereby:

1. Create the Governor's Task Force on Waste Materials Recovery and Disposal ("Task Force"); and
2. Provide that the Task Force shall consist of no more than 20 members appointed by the Governor to serve at the pleasure of the Governor; and
3. Provide that the Governor shall designate one member of the Task Force as chairperson to serve in that capacity at the pleasure of the Governor; and
4. Provide that the Task Force shall have the following mission:
 - a. Study and make recommendations regarding the economics of landfilling and recycling solid wastes, including the full environmental costs and benefits, and the extent to which those costs and benefits are reflected in the prices of landfilling and recycling and the associated fees collected by the state; and
 - b. Review the extent to which materials with economic value are lost to landfilling and recommend ways to maximize the productive use of waste materials, including materials recycling and composting; and
 - c. Study and recommend ways that Wisconsin can minimize the generation of waste materials, including incentives for waste materials reduction and reuse; and
 - d. Study the current management of toxic and nontoxic solid wastes and recommend ways to ensure that these wastes are managed in a manner that minimizes present environmental impacts and potential burdens to future generations; and
 - e. Consider the roles of Wisconsin municipalities, businesses and residents in the use, management and disposal of waste materials; and
5. Require the Task Force to provide ongoing reports to the Secretary of the Department of Natural Resources; and
6. Direct the Department of Natural Resources, and as appropriate, the Department of Administration and other state agencies to assist the Task Force with administrative and support services; and
7. Require the Task Force to submit a final report on its findings and recommendations to the Governor and that the Task Force shall dissolve when its final report is accepted by the Governor.



IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Wisconsin to be affixed. Done at the Capitol in the City of Madison this fourteenth day of June in the year two thousand five.


JIM DOYLE
Governor

By the Governor:


DOUGLAS A FOLLETTE
Secretary of State

Appendix B: Waste Statistics

Table 1: Waste Disposal as Reported by Wisconsin Landfills (in tons)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
MSW *											
Wisconsin	3,792,525	3,373,100	3,827,239	4,738,906	4,123,269	4,320,529	4,565,034	4,751,974	4,903,243	4,807,407	4,947,592.00
Out of State	498,242	206,201	500,358	340,048	911,882	1,075,869	1,067,926	1,106,928	985,844	1,179,732	1,786,865.00
Total MSW	4,290,767	3,579,301	4,327,597	5,078,954	5,035,151	5,396,398	5,632,960	5,858,902	5,889,087	5,987,139	6,734,457.00
Non-MSW *											
Wisconsin	4,610,426	5,255,080	4,905,655	4,761,775	5,145,142	4,473,126	3,960,079	4,085,806	3,841,323	3,650,693	3,995,158.00
Out of State	86,632	74,546	100,151	147,476	432,548	310,780	369,499	438,300	421,208	301,260	368,499.00
Total Non-MSW	4,697,058	5,329,626	5,005,806	4,909,251	5,577,690	4,783,906	4,329,578	4,524,106	4,262,531	3,951,953	4,363,657.00
Totals											
Wisconsin	8,402,951	8,628,180	8,732,894	9,500,680	9,268,410	8,793,655	8,525,113	8,837,780	8,744,566	8,458,100	8,942,750.00
Out of State	584,874	280,747	600,509	487,525	1,344,431	1,386,649	1,437,425	1,545,228	1,407,052	1,480,992	2,155,364.00
Total Waste	8,987,825	8,908,927	9,333,403	9,988,205	10,612,841	10,180,304	9,962,538	10,383,008	10,151,618	9,939,092	11,098,114.00

* MSW - Municipal Solid Waste (Residential and Commercial)

* Non-MSW - Non Municipal Solid Waste (Industrial)

Trends in MSW Generation in Wisconsin 1995 - 2004

Per Capita MSW Generation (Wisconsin)

Tons generated	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
4,290,767	3,373,100	3,827,239	4,738,906	4,123,269	4,320,529	4,565,034	4,751,974	4,903,243	4,807,407	4,947,592.00
Population	5,137,004	5,173,828	5,213,329	5,255,323	5,295,420	5,330,710	5,422,403	5,468,051	5,504,078	5,552,607
Pounds per capita per day	3.60	4.05	4.98	4.30	4.47	4.69	4.80	4.91	4.79	4.88
Pounds per capita per year	1313	1479	1818	1569	1632	1713	1753	1793	1747	1782

Sources:

Landfill tonnages: DNR Annual Landfill Tonnage Reports (<http://dnr.wi.gov/org/aw/wm/solid/landfill/tonnagerpts/lfTonnages.htm>)

Population: DOA annual Population estimate updates with DNR estimates of tribal populations

Table 2: Tons of Municipal Solid Waste Diverted from Disposal by Recycling and Composting Since 1990 in Wisconsin

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Municipal Collection*	---	---	---	---	461,549	640,871	699,685	767,006	794,321	765,318	730,583	727,056	714,493	735,610	734,143
Other Collection**	---	---	---	---	---	695,619	659,805	615,484	611,169	723,987	708,297	711,944	714,743	719,421	726,986
MSW Collected for Recycling or Composting***	585,916	736,031	886,146	1,036,261	1,186,376	1,336,490	1,359,490	1,382,490	1,405,490	1,489,305	1,438,880	1,439,000	1,429,236	1,455,031	1,461,129
Yard Waste managed on site****		50,000	100,000	290,000	290,000	290,000	290,000	290,000	290,000	290,000	250,800	250,800	250,800	250,800	250,800
Total	585,916	786,031	986,146	1,326,261	1,476,376	1,626,490	1,649,490	1,672,490	1,695,490	1,779,305	1,689,680	1,689,800	1,680,036	1,705,831	1,711,929

Population	4,891,769	4,920,507	4,968,224	5,020,994	5,061,451	5,137,004	5,173,828	5,213,329	5,255,323	5,295,420	5,330,710	5,422,403	5,468,051	5,504,078	5,552,607
Per capita tons per year	0.12	0.16	0.20	0.26	0.29	0.32	0.32	0.32	0.32	0.34	0.32	0.31	0.31	0.31	0.31
Per capita lbs per year	239.55	319.49	396.98	528.29	583.38	633.24	637.63	641.62	645.25	672.02	633.94	623.27	614.49	619.84	616.62

Cumulative Tons Diverted Since 1990	22,061,271
Pounds per Capita Since 1990	8,462
Average Annual Pounds per Capita	651
Population Average 1990 - 2004	5,214,380

* Based on Annual Recycling Report data for local government collection programs

** Estimated diversion by Commercial and Institutions based on Franklin Associates reports for Wisconsin (FAL, 1998, 2001 and revised 2003)

*** Data is sum of reported data from local government collection programs (including yard waste collected) and estimated diversion by commercial and institutions, based on Franklin Associates reports for Wisconsin (FAL, 1998, 2001 and revised 2003)

**** FAL estimate of leaves, grass clippings and small brush managed onsite by landowners in Wisconsin; all was assumed to have been landfilled in 1990

Appendix C

A. Organizational Approach for Substantive Deliberations

Early on, the Task Force realized the breadth of its assignment. Concepts of product stewardship are rapidly evolving, as are guiding principles for waste minimization, recovery and disposal. Simply put, many others are debating these very same issues at the very same time as the Task Force. Our objective was to draw upon these resources as we identified issues, and considered options, relevant to conditions in the State of Wisconsin. The need to triage issues – to pick those warranting more immediate attention – was recognized early on in our deliberations. The Task Force focused on issues where an immediate impact could be achieved while at the same time assessing issues that may require attention on a long-term basis.

Among the key concepts warranting substantive attention were the following:

- Producer responsibility to reduce the amount of waste produced through manufacturing and marketing and to promote broad participation in the consequences of ultimate waste disposal.
- Waste-as-a-resource to recognize the unrealized economic value of material going to landfills through:
 - diverting recoverable materials
 - developing markets for reuse, and
 - educating the public as to the merits of these endeavors.
- Improved recycling systems to promote broader participation in resource recovery.
- The “true” economic and social costs of waste management alternatives.
- A holistic approach to integrated waste management recognizing that no single action will solve all problems and that many actions have unintended effects.
- A movement towards sustainability by replacing command and control regulations with more comprehensive management practices.

These concepts were critical to Task Force deliberations.

To promote more detailed deliberations than could perhaps be accomplished by the Task Force as a whole, the following work groups were formed to address key areas of concern:

1. Economics and Institutions Work Group

Chaired by Rich Bishop, this work group explored the “true cost” of various waste management options, including the relationship between “cost” and “fees” or

“charges.” It assessed the roles of the private and public sector in waste management. Issues considered included the following:

- Does the market price for land disposal in Wisconsin reflect the full cost of land disposal?
- What is the economic value of materials “lost” to landfills?
- What economic incentives and disincentives might work more efficiently to recover materials “lost” to landfills and/or to reduce waste generation by residents and businesses?
- Are there institutional barriers that prevent the “highest value” use of a waste material?
- Who should be responsible for management of wastes – public sector, private sector, or a combination of both?
- Are the levels of government currently charged with managing wastes best suited for the task?
- Do Wisconsin counties and municipalities have sufficient authority to effectively plan and implement waste management strategies?

Brian Borofka, Paul Jenks, Meleesa Johnson, John Reindl, Mike Slattery, Brian Tippetts, and Arthur Vogel were members of this work group. DNR support was provided by Brad Wolbert.

2. Land Use Work Group

Chaired by Mike Michels (11/05 – 2/06) and Chuck Larscheid (3/06 – 12/06), this work group focused on the liabilities, risks and land use implications of various waste management options. It considered state and regional disposal capacity and issues associated with the best use of land in an integrated waste management system (i.e., a system that relies on a combination of disposal, reclamation, and waste minimization). Issues considered included the following:

- How do land use decisions fit into an integrated waste management system?
- At what rate should Wisconsin develop waste disposal capacity?
- Should Wisconsin promote regional landfills or regional recycling centers?
- What role should alternative waste disposal technologies (waste-to-energy; conversion; bioreactors) play in Wisconsin?
- Should additional items (mercury; electronics; plastic film; organic wastes) be banned from land disposal in Wisconsin?

- Should Wisconsin identify areas within the state that are “off-limits” to landfills?
- Does the current system of financial responsibility for landfills adequately account for their environmental and financial liabilities?

Preston Cole, Chuck Larscheid, Lynn Morgan, Sonya Newenhouse, and Keith Reopelle were members of this work group. DNR support was provided by Larry Lynch and Mike Degen.

3. Waste Reduction Work Group

Chaired by Jenna Kunde, this work group examined current trends, like the leveling off of recycling rates in Wisconsin. It considered cradle-to-grave strategies for waste minimization, including extended producer responsibility for product wastes. Issues considered included the following:

- What role does waste reduction (both minimizing waste and greater reclamation) play in an integrated waste management system?
- Whose responsibility should it be to manage product wastes (producer, consumer, others)?
- What are the best opportunities for increasing the recovery rate of useful materials otherwise destined for land disposal?
- What are the space/location requirements for greater waste reduction initiatives?
- Do the current regulatory systems and industry structures allow for significant improvements in recycling rates?
- Is the current state recycling program designed to accomplish its goals efficiently? If not, what improvements can be made?
- Can Wisconsin make fundamental changes in materials management effectively by itself?

George Dreckmann, Frank Ericson, Loreen Ferguson, Jeff Fielkow, Brian Jongetjes, and Gary Zajicek were members of this work group. DNR support was provided by Cynthia Moore.

Finally, the Task Force emphasized transparency in its deliberations. To that end, with assistance from the Departments of Natural Resources and Administration, a Web site was created to report on Task Force deliberations, provide notice of meetings, and provide a vehicle for the submission of public comments. The Web site is located at www.wasteresources.wisconsin.gov. It can also be accessed through Governor Doyle’s Web site by selecting “Governor’s Initiatives” at www.wisgov.state.wi.us.

B. Public Meetings and Hearings

The Task Force met in full session every four to six weeks from late August 2005 through December 2006. During the first half of its tenure, meetings began with a series of background presentations for members to develop a common understanding of issues relevant to our mission. The following topics were among those presented to the Task Force:

- Recycling and landfill programs in neighboring states.
- Product stewardship or “extended producer responsibility,” including product take-back requirements and efforts to minimize packaging.
- Recycling and disposal of waste associated with electronics (E-Waste).
- The Wisconsin landfill stability initiative to promote rapid stabilization of municipal solid waste. The status of out-of-state waste, including imports/exports and a primer on Commerce Clause limitations.
- European initiatives placing greater emphasis on producer responsibility.
- Disposal and recycling of construction and demolition waste (C&D Waste).
- The “waste paper economy,” including factors relevant to Wisconsin paper mills.
- Management of plastic materials in Wisconsin agriculture.
- The impacts of open burning (burn barrels).
- “Single stream” recycling and collection efforts.
- Initiatives in neighboring states (Iowa, Minnesota).

A summary of these presentations can be found in minutes posted under the “Meetings” header at www.wasteresources.wisconsin.gov. Many of the presentations themselves can be found under the “Documents” header at the same Web address.

All Task Force meetings were open to the public. In addition, properly noticed public hearings, designed to solicit input from the general public, were held in Waukesha (10/19/05), Eau Claire (11/16/05), Wausau (9/13/06), and again in Waukesha (10/4/06). In addition, public comments could be submitted at any time through the Task Force Web site. All public comments made or submitted were circulated to Task Force members, addressed in subsequent discussions, and considered in preparation of this final report.

Appendix D: Economic Framework for Analysis of Solid Waste Recovery and Disposal Alternatives

Part of Governor Doyle's charge to the Task Force was to:

“Study and make recommendations regarding the economics of landfilling and recycling of solid wastes, including *the full environmental costs and benefits, and the extent to which those costs and benefits are reflected in the prices* of landfilling and recycling and the associated fees collected by the state.” (Emphasis added)

This report provides a conceptual framework for addressing this part of the Task Force's charge. It seeks to provide the tools for thinking about “full environmental costs and benefits” and how those costs and benefits might or might not be reflected in prices. Wisconsin, and indeed our nation, is far behind Europe in quantifying costs and benefits and building economic incentives that reflect those cost and benefits. We seek a framework into which the various parts of the puzzle can be fitted as more is learned in Wisconsin and other states. Where studies are available or could be constructed, we will also provide practical illustrations of the concepts that must first be presented in rather abstract terms.

Part of what we have to say relates to proper accounting. Implicit in Governor Doyle's charge is the need to address the full *net social costs* of collecting and disposing of our state's solid waste stream through landfilling, incineration, recycling, and/or composting. The accounting perspective needs to be *social*. That is, it must seek, at least in principle, to recognize all the costs of waste recovery and disposal borne by all the residents of our state. (Indeed, if we are to be good citizens, costs borne by people outside the state must also be considered.) This means that both *financial* and *external* costs must be taken into account.

Financial costs are the costs that are borne directly by public and private entities as a result of waste recovery and disposal. One example would be the costs borne by a municipality or a private waste hauler to own and operate a fleet of trucks to collect solid waste. Another would be the out-of-pocket costs of operating landfills, incinerators, and facilities for recycling and composting. *External costs* are costs borne by the broader public as waste recovery and disposal occurs. External costs are often environmental in nature.

The health, aesthetic, and other effects of air pollution from landfills and incinerators are often mentioned as examples. The financial and external costs of waste recovery and disposal are often offset, in part at least, by benefits. Hence, proper accounting requires the consideration of *net social costs*, that is, financial and external costs net of offsetting benefits. Examples of benefits include the value of materials that are recovered from recycling and the value of the electricity produced when gas from landfills is recovered and burned for electricity generation.

We believe that the public interest would be served if, in the future, the State of Wisconsin sought to weigh the net social costs of the alternatives when choosing strategies to deal with solid wastes. Currently, financial costs dominate decision processes. Future choices about policies and regulations should be rooted in an expanded accounting of the broader costs borne and benefits received by the

public at large. In fulfilling our responsibilities as part of the U.S., net social costs borne by those in other states should also be considered.

At the same time, proper accounting is only part of the economics of solid waste management. When the Governor referred to “the prices of landfilling and recycling and the associated fees collected by the state,” he was pointing toward what environmental economists have come to call *incentive-based mechanisms* for policy implementation. The quantity and quality of waste generated and how that waste is dealt with by households, firms, and governments at various levels are shaped by an intricate web of incentives. Solid waste management could be reshaped by altering these incentives through public policies, education and technical assistance, regulations, fees, taxes and subsidies.

Consider an example that is attracting a lot of attention. Most communities around the country depend on households to sort out recyclables. It is hoped that households will contribute the time and energy needed to do this properly. Many jurisdictions have even made recycling mandatory. No one doubts how much this approach has accomplished, but recycling rates have plateaued even though substantial shares of total recyclables continue to end up in the trash. Even where recycling of specified materials is a legal requirement, enforcement has been difficult. Beginning in 2004, Philadelphia has been the site of an experiment to see if the rate of recycling in its mandatory recycling program can be increased through positive incentives. The system is called RecycleBank and here is a description of how it works (Biddle 2006, p. 12):

Using a system of address-specific carts embedded with radio frequency identification (RFID) chips, and packer trucks retrofitted with on-board computerized scales, RecycleBank registers the weight of recyclables for every household on a curbside collection route and then provides credits to them through the Internet or via an automated phone system.

Credits, known as RecycleBank Dollars, can be converted into product and service discounts with well over 100 businesses (both local and national).

The results are impressive. Biddle (2006) reports that RecycleBank has enhanced weekly recycling rates by 75 percent or more. One news report (<http://www.recyclebank.com/faq.cfm>) indicates that for Philadelphia as a whole, recycling averages about five pounds per week per household, while the households in the initial RecycleBank experiment recycled at a rate of 35 pounds per week.

Our point at this juncture is a simple one: RecycleBank illustrates how incentives can have a big impact on recycling. RecycleBank helps make the case for why incentive-based mechanisms are well worth Wisconsin’s attention as it endeavors to improve the state’s waste management systems.¹

¹ We are only using RecycleBank to illustrate one example of incentive-based mechanisms in waste management. It goes almost without saying that a system like RecycleBank raises a lot of economic issues. Substantial up-front investments are required and additional money must be spent on maintenance and calibration of technologically advanced and conventional equipment, community education, record keeping, contracting with partners, etc. There have got to be many pluses and minuses to weigh against each other in evaluating such a system. That private capital is being attracted to the industry is a positive sign, but much more needs to be learned about the approach and how it might be fine tuned.

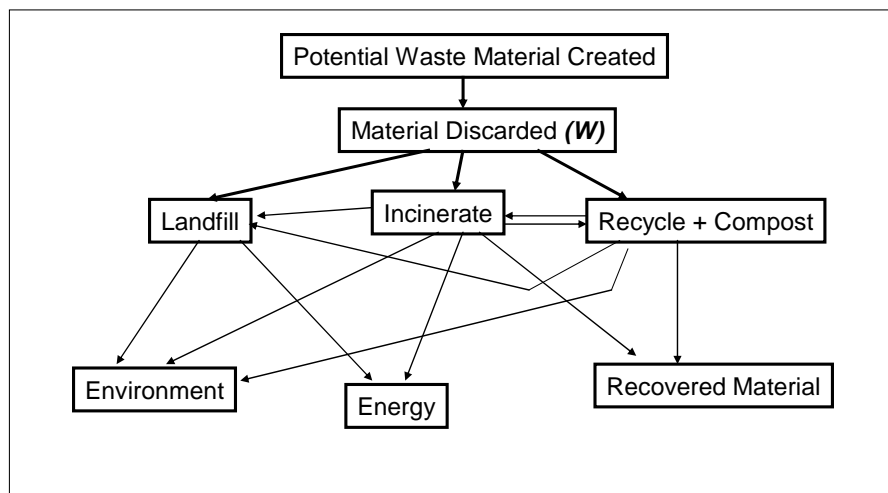
So, this report is about accounting and incentives. The next section lays out our social cost accounting framework. This is necessarily a conceptual exercise and the following section will make the ideas clearer and more cogent by looking at some actual applications in the European Union and here in Wisconsin. The last major section focuses on incentive-based mechanisms for waste management.

A. Framework for Analysis of Net Social Costs

Begin by supposing that some amount of waste, call it W , is being generated each year in a given jurisdiction. W represents the total waste stream that must be dealt with by some responsible unit or combination of units, often with the participation of private companies. Assume that W can be divided into the proportions that go to a landfill, an incinerator, and recycling facilities. To simplify a bit, composting will be included as part of recycling, although in actual applications, composting may need to be considered separately since it has its own kinds of costs and impacts compared to recycling more narrowly defined. Figure 1 portrays schematically the waste recovery and disposal system that will deal with W . Arrows depict the flow of materials through the system. For now we take W as a given quantity measured, say, in tons, which has a predetermined composition. In reality, the quantity and quality of W is determined by incentives and we will consider how W might be changed later, but for now it is taken as a given.

Along each arrow in Figure 1 costs and/or benefits are generated. To arrive at the net social cost of dealing with W , we need to add up the net social costs of landfilling, incineration, and recycling. Let W_l , W_i , and W_r represent the quantities of waste going into landfills, incineration, and recycling, respectively. Since all waste must go somewhere, $W_l + W_i + W_r = W$ must hold. We will assume that the area where W is generated already has an operating landfill and/or incinerator.

Figure 1: Overview of the Waste Recovery and Disposal System



Consider first the net social costs of disposing of W_l in the area's landfill. Table 1 provides a summary. Collection of W_l and operation of the landfill both entail financial costs and whether these

outlays are by public or private entities, they are part of the social costs of disposing of materials in the landfill. Furthermore, W_i will use up some of the landfill's capacity, hastening the day in the future when the landfill will be full and dollars must be expended—again by private and/or public entities—to care for the site and to find a location for and open a new landfill. The fact that putting part of W_i in the landfill uses up landfill capacity thus creates what economists sometimes refer to as “user costs.”

The concept of user costs is widely used in economics. Consider an example from mining. When a ton of ore is mined, extraction costs generated as labor, capital, natural resources, and management are expended to get the ore out of the ground. But there is more to the cost of mining. A ton mined now will not be available to use in the future. Hence, extraction of a ton of ore involves a user cost based on what that ton would have been worth if instead it had been mined later.

Table 1: Net Social Costs of Managing Materials Going to Landfills

- Financial Costs
 - Collection
 - Operation
 - Financial user costs
 - Care from the time of closing until the landfill becomes inert (may even include relocation of materials in some cases)
 - Siting and opening of future landfills
- External Costs
 - Collection
 - Operation
 - Landfill disamenities
 - Air and water emissions
 - External user costs
 - Opening new landfills
- Offsetting Benefits
 - Revenues from electricity sold
 - External costs of displaced conventional electricity generation

Likewise when W_i goes into the landfill, the costs include not only those associated with landfill operation, but also the user costs from having used up landfill capacity. Hence, the financial costs of disposing of W_i in the landfill must include a user cost consisting of the financial costs of having to begin care of the site once it is filled to capacity and of creating capacity at a new site sooner than if W_i had been disposed of in some other way.

Since these costs will be incurred in the future, they are measured after accounting for compound interest. And, “time is money,” as the old saying goes. Hastening the day when perpetual care begins and a new landfill site must be located and opened will use money that could otherwise have been spent for other purposes. If nothing else, the money could have been put in the bank and earned interest. So user costs are stated in “present value” terms, after allowing for compound interest. The

economic argument for including interest in such calculations will be referred to here as the “time-is-money principle.”

External costs of the landfill could potentially take many forms. Other types of external costs may be present, but costs related to the environment most often come to mind. For example, collection of trash destined for the landfill would involve operation of motor vehicles with associated air emissions, which can have health costs and contribute to air pollution in other ways that are costly. Landfill operations can also lead to air emissions and can affect water and associated resources. Landfill disamenities can stem from traffic congestion, odors, noise, disruption of visual amenities, and other effects. And siting of new landfills comes with its own environmental costs, which should be thought of as external user costs.

Financial and external costs of landfills are often offset at least in part by benefits. Table 1 includes the benefits from capturing methane from the landfill and using it to generate electricity, a practice that landfill owners are employing more and more often these days. The value of the electricity counts as a benefit from the landfill. A second benefit is also possible from using landfill gas to generate electricity. Electricity from landfill gas displaces electricity from conventional sources such as coal-fired power plants. The reduced external costs of displaced conventional generation become part of the benefits of gas recovery at the landfill.

The costs and benefits described in Table 1 are meant to be illustrative rather than exhaustive. Other costs and benefits, both financial and external, can be easily fit into this framework. For example, once a landfill is filled to capacity, the site can be converted to open space, which can generate benefits (external benefits it turns out) for local citizens.

Tables 2 and 3 are structured in the same way as Table 1 and focus on the net social costs of incineration of W_i and recycling of W_r . Many of the items are very similar to those for landfills and do not require further elaboration. Nevertheless, because so much attention in the past has focused on the external costs associated with landfills, it is worth noting explicitly that incineration and recycling may entail their own external costs. For example, incinerators, recycling, and compost facilities have air emissions. Incinerators, recycling plants and composting operations can lead to site disamenities not unlike those near landfills. When it comes to dealing with the external costs of solid waste management, there is no clear winner among the alternatives without actual evidence on the magnitude of net social costs.

As was the case for electricity generation from landfill gas, electricity generation at incinerators displaces conventional sources of electricity, creating a benefit by reducing external costs from the displaced source. Furthermore, valuable materials such as ferrous metals may be recoverable once the burning process is complete. A benefit is created when recycled materials displace virgin materials, thus reducing the external costs generated when virgin materials are extracted and used to manufacture products.

Table 2: Net Social Costs of Managing Materials Going into Incinerators

- Financial Costs
 - Investment in plant and equipment
 - Collection
 - Operation

- External Costs
 - Collection
 - Operation
 - Air emissions
 - Incinerator disamenities

- Offsetting Benefits
 - Electricity revenues
 - Value of recovered materials sold (e.g., ferrous metals)
 - Reduced external costs of displaced conventional electricity generation
 - Reduced volume for landfilling
 - Beneficial reuse of residue (ash)
 - Nearly complete recycling of ferrous material

Table 3: Net Social Costs of Managing Materials Going into Recycling and Composting

- Financial Costs
 - Investment in collection equipment and recycling plant and equipment
 - Collection
 - Operation

- External Costs
 - Collection
 - Operation
 - Recycling plant disamenities

- Offsetting benefits
 - Value of recovered materials sold
 - Reduced external costs of using virgin materials

B. Estimates of Net Social Costs

Unfortunately, so far as we know, there have been only very limited estimates of the net social costs of various waste management strategies in the U.S., and the studies available to us have provided little documentation of how their results were calculated. The potential magnitudes that may be involved can, however, be illustrated in two ways.

First we consider a study done for the European Union by Brisson (1997) as her doctoral thesis, including extensive description and documentation of her methods and data. Her results are summarized in Table 4. She developed estimates for several different methods of dealing with waste streams. To illustrate her results, we chose one set of figures for a particular system involving curbside pick up of both trash and recyclables. Two figures are given for incineration depending on whether electricity generated at incinerators was assumed to replace power from the dirtiest coal plants or average coal plants.

We need to note immediately that these are crude estimates and they are based on many assumptions that Brisson had to make to fill large gaps in the information available in Europe. Even if she had had the information to make more accurate estimates, there are many reasons to suspect that they would not be directly applicable to the United States. Still, Brisson's results are interesting.

Recycling turned out to have the lowest net social cost per ton. In fact, the net social cost of recycling turned out to be negative, indicating that benefits more than offset costs. Recycling came out on top because of relatively low external costs, substantial offsetting benefits from recovered materials, and reduced external costs of displaced virgin materials. Landfilling turned out to be the next lowest cost approach because of relatively low financial costs, significant offsetting benefits from electricity production, and associate external cost reductions in the conventional energy sector.

Table 4: Crude Estimates per Brisson of the Net Social Cost of Waste Management in the EU (Euros/Ton)

Recycling	-130
Landfill	91
Composting	102
Incineration	114
Incineration	148

Given that euros and dollars were approximately equivalent at the time the Brisson study was done, these numbers are impressive. The external costs and offsetting benefits that would be overlooked in analyses that focus only on financial costs appear to be relatively large and this could carry over to the U.S. even if the specific numbers are different.

Our second effort to investigate net social costs brought us a lot closer to home. We went as far as we could, given limited time and resources, toward duplicating Brisson's work for the U.S.

We started with the Decision Support Tool (DST) of the U.S. Environmental Protection Agency (Research Triangle Institute 2006). In the 1990's, EPA commissioned Research Triangle Institute to develop a model for the US that would be capable of estimating the financial costs, energy use, and

air and water emissions attributable to alternative strategies for dealing with municipal solid waste. The DST is capable of analysis at the state level.⁴⁴

The DST contains one feature that bears some emphasis. As was pointed out in the preceding section, when materials are recycled, air and water emissions are generated. These are accounted for in the model. But the model also provides estimates of reduced external costs when recycled materials are substituted for virgin materials. The model accounts for these under the heading of “remanufacturing offsets.” Likewise, when electricity is generated at landfills and incinerators, the model accounts for reduced emissions from conventional power plants. Hence the DST allowed us to account for this aspect in a manner comparable to Brisson (1997).

We were able to tailor some of the assumptions used in running the DST to Wisconsin’s situation. In particular, we built the following assumptions into the analysis:

- We assumed that annual collection of municipal solid waste in Wisconsin totals 5,246,811 tons, the best estimate we had for recent years.
- We assumed, based on the best information we could find, that 22 percent of this total would be recycled and 6 percent would be lawn and garden waste that would be composted.
- In keeping with the current situation in Wisconsin, it was assumed that another three percent would go to waste-to-energy incinerators.
- We assumed that the remainder would go to landfills. In keeping with expectations of task force members, we assumed that in the future these would be bioreactor landfills. Energy production was assumed to begin five years after opening each landfill and continue for 10 years after closing. Internal combustion engines were assumed to be used to generate the power.
- One-way haul distances for recycling and landfilling were assumed to be 20 miles. For composting, we assumed 15 miles.
- Recent experience in Dane and Portage Counties was considered in setting the financial cost of recycling including collection and processing and net of the value of recovered materials at \$100 per ton. Financial costs for landfilling, net of the value of electricity generated, also was also set at \$100 per ton based on experience in these counties.
- Based on information from La Crosse County, we assumed that the costs of trash collection and operation of waste-to-energy incinerators total about \$100 per ton as well.

The model was run under these assumptions and the results appear in Table 5. Negative numbers for emissions signify net improvements in emissions. For example, the model estimated that, were Wisconsin to deal with its waste stream under the assumptions just described, there would be a more than 29 million pound *reduction* in emissions of particulates. This is a direct result of using recycled rather than virgin materials and generating power from landfill gas and incineration compared to conventional sources. It is to be emphasized that the DST is a national model and these changes in emissions are for the nation as a whole, and not for Wisconsin. In fact, most of the changes in

⁴⁴ The Task Force is most grateful for the support of Veolia ES Solid Waste, Inc., which made it possible to use the DST model. We also thank Mr. John Baker of Alan Environmental, LLC, who worked with us and with RTI International to get the model runs done.

emissions would occur outside Wisconsin. The DST does not support the disaggregation of emissions by state.

Table 5: Results from the DST Model Designed to Approximate Future Conditions in Wisconsin

Parameter	Units	
Cost	\$	745,647,263
Energy Consumption	MBTU	-33,895,961
Air Emissions		
Total Particulate Matter	lb	-29,036,526
Nitrogen Oxides	lb	-14,160,314
Sulfur Oxides	lb	-33,433,694
Carbon Monoxide	lb	-35,616,098
Carbon Dioxide Biomass	lb	-1,829,413,995
Carbon Dioxide Fossil	lb	-1,829,413,995
Carbon Equivalents	MTCE	-157,431
Hydrocarbons (non CH4)	lb	-1,955,842
Lead	lb	-2,247
Ammonia	lb	-152,069
Methane	lb	32,138,947
Hydrochloric Acid	lb	-125,882
Ancillary Solid Waste	lb	-649,890,302
Water Releases		
Dissolved Solids	lb	758,375
Suspended Solids	lb	-261,997
BOD	lb	4,571,855
COD	lb	-7,302,483
Oil	lb	1,319,833
Sulfuric Acid	lb	-11,063
Iron	lb	333,660
Ammonia	lb	-23,777
Copper	lb	19
Cadmium	lb	-479
Arsenic	lb	0
Mercury	lb	0
Phosphate	lb	-65,343,374
Selenium	lb	0
Chromium	lb	-521
Lead	lb	86
Zinc	lb	-2,173,208

We can use these numbers to explore, in a very preliminary way, the potential magnitude of net social costs for alternative strategies for dealing with solid wastes. Detailed results are shown in Tables 6, 7, and 8. For recycling, landfilling, and incineration, respectively, each table begins with an estimate of financial costs under our assumption that these costs are about \$100 per ton for all three ways of processing municipal solid waste. Next, each table shows energy used, measured in millions of BTUs. Negative energy use for landfilling and incineration indicates that they produce more energy than they use. Finally, in each table we list air emissions. Water emissions are not listed because we lack the dollar values to quantify the external cost of water pollution.

The column in each table under the heading “\$/ton” requires explanation. These are the dollar values used to quantify external costs and benefits, the latter shown as negative numbers in the tables. They were arrived at using procedures that are known as “benefits transfer” (Freeman, 2003, pp. 453-456). Benefits transfer takes monetary values for environmental benefits and costs from existing studies done at other locations and applies them in a new setting. Government agencies frequently cannot conduct original research to estimate monetary values because of financial and time constraints. Hence, benefits transfer is frequently used.

For our own benefits transfer exercise, we were fortunate to have a recent article (Eshet *et al.*, 2005) that provides a thorough, critical review of studies from around the world that have attempted to value external costs of air emissions from landfills and incineration or have results that are useful for that purpose. Where the number of studies was sufficient, we worked with values from their survey to get the numbers in the \$/ton column. We were able to do so for emissions of particulates, nitrogen oxides, sulfur oxides, carbon monoxide, carbon dioxide, and methane. In most cases, these are simple averages of the values found by Eshet *et al.* Then it was a simple matter of multiplication to estimate external costs (and benefits).

Of particular interest is the value of \$20,000 per ton for emissions of particulate matter, since it seems large and drives the results to a considerable degree, especially for recycling. It is based on 15 different studies from Europe and the U.S. For our value, we took the average values from studies that had more than one value. (Some studies contain more than one value because they evaluated external costs for more than one region or used more than one method of estimation.) Then we left out one value, which was so high as to seem questionable for our purposes, and averaged the rest. It is difficult to go deeper into the validity of the \$20,000 figure in a timely way since most of the studies it is based on are unpublished and difficult to access.

Unfortunately, documentation for the DST available to us failed to define particulates. Eshet *et al.* specify that their value applies to fine particulates, the so-called level PM₁₀. Fine particulates can have particularly deleterious effects on human health, so if the model is referring to all particulate matter including particle larger than PM₁₀ the \$20,000 may be an overestimate. This matter would benefit from further investigation. Two points can nevertheless be made in defense of \$20,000. First, during the period when the DST was being constructed, reducing PM₁₀ emissions was an important policy goal and EPA would likely have focused on that level for purposes of the DST. Particulates are tightly linked to human health effects and that can lead to large values, particularly if substantial numbers of premature deaths are involved. Second, in the late 1990s the EPA did a Regulatory Impact Assessment on new regulations for some air pollutants including particulates (USEPA, 1997). Compared to the benefit estimates in that study, \$20,000 per ton seems plausible and we will use it here.

Table 6 is the most complicated. It shows that the direct external costs of recycling, that is, the effects directly associated collection and processing of recyclables, to be around \$14.5 million per year. However, this is much more than offset by reduced emissions from virgin materials production of better than \$400 million. The remaining tables should be straightforward to read.

There are lots of reasons to look at these results with skepticism. The DST is only a model based on many assumptions. Some of the assumptions may be questionable for the U.S. as a whole and many of them probably do not fully apply to Wisconsin. Going from emissions to effects on human health and the environment and then to dollar values is a process that is fraught with uncertainties at every turn. The dollar values used are no better than the studies that went into the benefits transfer. Some of those studies may have been strong and others weak, yet there is no way to account for this.

Furthermore, to the extent that many of the studies used were from Europe, they may not be appropriate for the U.S. in general and Wisconsin in particular. And many external costs and benefits are surely unaccounted for. Only six of the air pollutants could be valued. This leaves many air pollutants and all water pollution unvalued. If one compares what we have done here with what would be measured under ideal circumstances, as described in Tables 1-3 above, many gaps become evident. User costs of landfill space; disamenities from landfills, recycling facilities and incinerators; external costs from collection; and several other items are not included in these numbers.

Table 6: Net Social Cost Calculations for Recycling including Yard and Garden Waste

		Direct Effects				Remanufacturing Offsets		
		Tons	\$/ton	Total \$	\$/ton of waste	Tons	Total \$	\$/ton of waste
Financial Cost	\$147,265,000	1,472,650						
Energy Consumption	780,351							
Air Emissions								
Total Particulate Matter		171	\$ 20,000	\$ 3,418,410	\$ 2	-13800	\$ (276,001,019)	\$ (187)
Nitrogen Oxides		542	\$ 6,810	\$ 3,693,644	\$ 3	-9036	\$ (61,532,363)	\$ (42)
Sulfur Oxides		801	\$ 5,383	\$ 4,310,844	\$ 3	-14048	\$ (75,621,936)	\$ (51)
Carbon Monoxide		89	\$ 191	\$ 17,018	\$ 0	-19706	\$ (3,754,005)	\$ (3)
Carbon Dioxide Biomass		98543		\$ -	\$ -	1629963	\$ -	\$ -
Carbon Dioxide Fossil		122794	\$ 24	\$ 2,922,486	\$ 2	-690589	\$ (16,436,020)	\$ (11)
Carbon Equivalents		17		\$ -	\$ -	-97	\$ -	\$ -
Hydrocarbons (non CH4)		48		\$ -	\$ -	-1212	\$ -	\$ -
Lead		0		\$ -	\$ -	-1	\$ -	\$ -
Ammonia		1		\$ -	\$ -	-70	\$ -	\$ -
Methane		245	\$ 624	\$ 152,952	\$ 0	-1144	\$ (713,796)	\$ (0)
Hydrochloric Acid		9		\$ -	\$ -	-102	\$ -	\$ -
Total				\$14,515,354	\$10		\$ (434,059,140)	\$ (295)

Table 7: Net Social Cost Calculations for Landfilling

		Tons	\$/ton Emitted	Total \$	\$/Ton of Waste
Financial Cost	\$ 269,699,700	2,696,997			
Energy Consumption	-2,045,651				
Air Emissions					
Total Particulate Matter		460	\$ 20,000	\$ 9,193,197	\$ 3
Nitrogen Oxides		-163	\$ 6,810	\$(1,107,129)	\$ (0)
Sulfur Oxides		-1748	\$ 5,383	\$(9,410,088)	\$ (3)
Carbon Monoxide		2861	\$ 191	\$ 545,072	\$ 0
Carbon Dioxide Biomass		803265		\$ -	\$ -
Carbon Dioxide Fossil		-271455	\$ 24	\$(6,460,632)	\$ (2)
Carbon Equivalents		8		\$ -	\$ -
Hydrocarbons (non CH4)		100		\$ -	\$ -
Lead		0		\$ -	\$ -
Ammonia		0		\$ -	\$ -
Methane		15631	\$ 624	\$ 9,756,940	\$ 4
Hydrochloric Acid		24		\$ -	\$ -
Total				\$ 2,517,359	\$ 1

Table 8: Net Social Cost Calculations for Waste-to-Energy Incineration

		Tons	\$/ton	Total \$	\$/ton
Financial Cost	\$ 14,029,000	140,290			
Energy Consumption	(789,531.42)				
Air Emissions					
Total Particulate Matter		-81	\$ 20,000	\$ (1,611,951)	\$ (11)
Nitrogen Oxides		-182	\$ 6,810	\$ (1,237,999)	\$ (9)
Sulfur Oxides		-428	\$ 5,383	\$ (2,305,497)	\$ (16)
Carbon Monoxide		36	\$ 191	\$ 6,917	\$ 0
Carbon Dioxide Biomass		103,593		\$ -	\$ -
Carbon Dioxide Fossil		-64,755	\$ 24	\$ (1,541,170)	\$ (11)
Carbon Equivalents		-9		\$ -	\$ -
Hydrocarbons (non CH4)		-10		\$ -	\$ -
Lead		0		\$ -	\$ -
Ammonia		0		\$ -	\$ -
Methane		-155	\$ 624	\$ (96,987)	\$ (1)
Hydrochloric Acid		12		\$ -	\$ -
Total				\$ (6,786,687)	\$ (48)

Despite these concerns, it is encouraging to see how close our results come to those of Brisson (1997), as shown in Table 4 above. Table 9 summarizes our results. Compared to Brisson’s net benefits of €130 per ton for recycling, we got \$185 per ton. Brisson estimated net social costs of €91 per ton for landfilling and we got \$98 per ton. Only for incineration do we get order of magnitude differences with our results showing incineration in a much more favorable light.

While very preliminary, these results are interesting. Table 9 shows that including external costs could make a big difference in how we in Wisconsin view alternative strategies to deal with our municipal solid waste stream. Financial costs alone would tend to make us indifferent from an economic point of view about whether we recycle, landfill, or incinerate. Regardless, the financial cost is about \$100 per ton.

Once external costs, as estimated here, are added in, the picture is very different. Recycling actually produces net benefits of \$185 per ton. Generating electricity at waste-to-energy incinerators more than offsets its external costs making its net social costs only \$52 per ton. Landfilling produces a small external benefit, but comes in last with a net social cost of \$98.

The recycling results are particularly striking and support the Task Force’s emphasis on increasing the share of recyclables that are actually recycled in our state. If Wisconsin is willing to count the effects of its decisions on other states, recycling pays a hefty dividend. Given that so many of the social benefits of recycling could not be quantified, the true number could well be larger. We worried about whether \$20,000 per ton might be incorrect on the high side. In fact, if we were to assume that there are no external benefits from reduced particulates and that there are no other external benefits—very strong assumptions indeed—recycling would still about break even. We could essentially recycle wastes for free once the benefits from the other air pollution reductions counted in Table 6 enter the equation.

The results also point toward the need to reconsider incineration as an option. It appears entirely possible that incineration is a better deal than landfilling many waste products.

Table 9: Summary of Financial Costs, External Costs, and Net Social Costs

		Total	\$/ton of waste
Recycling			
	Financial Cost	\$ 147,265,000	\$ 100
	External Cost	\$(419,543,786)	\$ (285)
	Net Social Cost	\$(272,278,786)	\$ (185)
Landfilling			
	Financial Cost	\$ 269,699,700	\$ 100
	External Cost	\$ (6,675,838)	\$ (2)
	Net Social Cost	\$ 263,023,862	\$ 98
Incineration			
	Financial Cost	\$ 14,029,000	\$ 100
	External Cost	\$ (6,786,687)	\$ (48)
	Net Social Cost	\$ 7,242,313	\$ 52

We turn now to incentive-based mechanisms. In making the transition, it is important to recognize explicitly how accounting for net social cost of waste disposal alternatives and incentive-based mechanisms are related. Basically, what economists seek are incentive mechanisms that force firms, households, and other economic entities to directly bear the net social costs of their decisions. Examples of such decisions are easy to come by. Everyday, businesses make choices about the design of the products they will sell to consumers, products that will eventually become part of the waste stream. They also choose how to package those products. Households and businesses decide which of the products to buy and what to throw in the garbage and in the recycling bin. Incentive-based mechanisms seek to influence such choices in ways that reflect the net social costs of solid waste management alternatives.

C. Incentive-based Mechanisms in Concept

In this section, we intend to lay out a conceptual foundation that will help Wisconsin think about regulating solid waste recovery and disposal in new ways. The approach we have in mind seeks ways to shape the quantity and quality of the waste stream through monetary incentives that bring the prices paid and received by firms, consumers, and others—possibly including taxes, user fees, and subsidies—more into line with the net social costs of waste recovery and disposal. In simple terms, this is sometimes referred to as “getting the prices right.” Getting the prices right involves bringing prices in the marketplace into line with net social costs.

As we shall see later on, Wisconsin does employ some incentive-based mechanisms. For example, some communities levy charges for garbage collection depending on how much is thrown out. This is an incentive-based mechanism that places a financial burden where it ought to be, on the shoulders of those deciding between disposal in the trash and recycling. Still, we would argue that much more could be accomplished if Wisconsin were to employ incentive-based mechanisms more broadly.

Laying out the bare bones of incentive-based mechanisms as they apply to waste management necessarily requires a foray into economic theory. The real world is frequently just too complicated to take in all at once. Economic theorists seek abstract “models” that are simple enough to show clearly the incentives that firms and households face and how those incentives might be altered to reshape behavior in ways that reflect social benefits and costs. Such abstractions come at a cost, however. Sometimes, when the complexities of the real world are added back into the analysis, theoretical ideas for reshaping incentives prove to be simplistic to the point of being unworkable and can even seem downright naïve. Still, in applications to such areas as air pollution and commercial fishery regulation, insights that come from economic theory have provided new ideas for incentive-based mechanisms that have proven workable. We believe solid waste and recycling management is ripe for new, incentive-based approaches to regulation.

While the exposition will be simplified by thinking in terms of “firms and households,” other sectors of the economy ultimately matter as well. Governments at various levels will be in the background, not only as possible regulators, but also as generators of solid waste. Institutions such as colleges and hospitals contribute to the solid waste stream. The underlying presumption is that governments and other institutions, along with firms and households, seek to keep costs down and will respond to monetary incentives.

In considering alternative policies to address pollution and other external costs, environmental economists distinguish between “command and control” and “incentive-based” strategies. In the solid waste field, examples of command and control strategies include banning of undesirable products from landfills and mandating that products contain at least a specified amount of recycled materials. In contrast, incentive-based mechanisms involve direct monetary incentives.

We draw extensively here on an excellent paper by Porter (2004). Continuing to simplify a bit, we can distinguish between three types of incentive-based mechanisms:

- *Advance disposal fees* (ADFs) are charges or taxes levied on firms and/or households as new goods are sold. In principle, ADFs bring the “effective price” (the price that would be charged in the absence of regulation *plus the ADF*) into line with the net social cost of eventual disposal. Depending on which branch of the waste disposal stream an item is headed for, ADFs can reflect the net social costs of landfilling, incineration, or recycling. If an ADF is levied against a good’s producers, the producers will pass the charge along to consumers as part of the good’s price. If it is levied against consumers or firms at the point of sale, the effect is the same as buyers adding the ADF onto the good’s price tag. Either way, the good’s effective price is “right.” That is, it reflects not only the manufacturing and marketing costs but also the eventual net social costs of disposal or recycling. An example would be to charge manufacturers of tires a fee for each tire sold with the money to be used for recycling of used tires.
- *Marginal trash charges* (MTCs) are charges levied against households and firms based on how much garbage they dispose of and, at least in the ideal, the content of their trash. MTCs have effects much like ADFs. Though the impact is delayed, they eventually modify the effective prices of products to the extent that consumers (including firms as well as households) consider eventual disposal costs when they decide what to buy. An example is the per bag charge for trash collection levied by many communities.
- *Recycling charges* (RCs) are charges for recycling levied when consumers recycle waste items. They can work like MTCs except that they are levied against items that are separated for recycling rather than placed in the garbage. In principle, RCs would be set to cover the net social costs of recycling. Notice that if net social costs are negative, indicating that the benefits of recycling exceed the costs (as we saw in the preceding section) then RCs would actually be “recycling refunds” paid to consumers when they recycle. An example of an RC would be charges levied at the time of disposal on car batteries where the money would be used to cover the costs of recycling them.
- *Green taxes on waste management systems.* Especially in Scandinavian countries, fees or “green taxes” have been placed on landfills and incinerators to represent the estimated environmental cost of handling materials in those systems.

Economists see some potentially important advantages of incentive-based mechanisms compared to more traditional command and control strategies. Let’s consider a simple example. The “widget” is a fictitious consumer product that economics teachers sometimes use to illustrate concepts like supply and demand without all the baggage that can make real world products confusing. Widgets can be used to further explain incentive-based mechanisms and to illustrate their potential advantages over command and control mechanisms.

Assume that the financial cost to produce and market a widget (including a normal profit for the firms involved) is \$90. Assume that this is the price consumers pay in the absence of regulation. Widget consumers may include firms as well as households. Widgets are consumed immediately and enter the solid waste stream.

Let us assume to begin with that widgets and other solid waste are collected and landfilled. Landfills are of one standard type that accepts all municipal solid waste, including used widgets. Using the definitions developed in the preceding section, the financial cost of landfilling widgets is assumed to be \$10 each. In addition, disposal of widgets involves external costs, perhaps because they contain toxic metals or potential air pollutants that may affect human health if not properly managed. Assume this external cost is \$25 per widget. Hence the net social cost of widget landfilling is \$35 per widget (\$10 in financial costs plus the external costs of \$25). For now, assume for the sake of argument that landfilling is the only option for used widgets. That is, by assumption, recycling of used widgets and illegal disposal are not possible. Recycling and illegal disposal will be dealt with later.

The current price of widgets (\$90) is not “right” because it does not include the net social cost of landfilling of \$35. Too many widgets will be produced and disposed of, introducing economic inefficiency and excessive widget-related pollution. The right price would be \$125. At that price, widgets will be produced in economically efficient quantities, landfill costs are covered, and only economically justified levels of widget-related pollutants would be introduced into the environment.

This problem might be dealt with by banning widgets from landfills, a command and control measure. In essence, consumers would no longer have the option of consuming widgets unless they can find some alternative way of disposing of their waste widgets, and we have ruled that out by assumption. We can now easily illustrate two economic shortcomings of such command and control strategies.

First, some consumers might gladly pay \$125 per widget (cost of production of \$90 plus net social cost of disposal of \$35) to enjoy their benefits. If consumers want to cover the full social costs of what they consume, from an economic perspective, we as a society will be better off if we let them do so rather than ruling out widget consumption altogether through the landfill ban. This is the economic principle of consumer sovereignty.

Second, widget manufacturers will experience reduced incentives to come up with better widgets that would be less polluting or otherwise cheaper to dispose of. They could still try to invent better widgets in the hope of getting the landfill ban rescinded, but they would have no a direct price incentive to do so.

Incentive-based mechanisms are an alternative to landfill bans and other such “command and control” strategies. The “right price” of widgets of \$125 each could be accomplished through either a \$35 ADF per widget sold or an MTC of \$35 per widget tossed in the garbage. If the ADF is levied against producers, then they will pass it on to consumers. If the ADF or the MTC is levied against consumers, then even though the market price of widgets is still \$90, the effective price is correct at \$125. Consumers would behave accordingly in deciding how many widgets to buy, use up, and toss in the trash.

A number of economically desirable things would happen once the price of widgets is right. Funds to cover both the financial and external costs of disposal would be available. Fewer widgets would be produced as consumers have less incentive to buy widgets due to the higher effective price and more incentive to substitute other goods and services. Those consumers who are willing to pay the full net social cost of widgets could still do so. Provided the ADF or MTC is adjusted to reflect new technologies, manufacturers would have an incentive to develop new widgets that have lower disposal and/or external costs. If manufacturers pay the ADF directly, the better widgets would allow them to avoid or at least reduce the fee. If consumers pay the ADF directly at the time of purchase or the MTC at disposal, their willingness to pay for less polluting widgets would be communicated to manufacturers through the market. Money raised through the MTC could be used to cover the financial costs of landfilling and to reduce the effects of widget-related pollution or for some other public purposes.

The widget example can be expanded to help introduce the economics of recycling. We will suppose that only households consume widgets and thereafter dispose of them when they are used up. The principles would be the same if firms consume widgets, but assuming that away will make for a simpler exposition. Suppose the net social cost of recycling (as defined in Table 3) is \$20 per widget. The option of landfilling widgets for \$35 each remains on the table.

Clearly, the economic ideal would involve recycling all used widgets, thus saving disposal costs, including external costs, of \$15 per widget. The “right” price for widgets is \$110 (the \$90 price tag plus \$20 in net social costs of recycling). Assume that, prior to initiating regulation, widget landfill disposal and recycling are available without a direct charge per widget.²

A command and control strategy here would be to make widget recycling mandatory and ban them from landfills. So long as illegal dumping is ruled out by assumption, this will work since households will not be able to secretly slip widgets into the trash or toss them out their car windows. They will have no choice but to recycle used widgets. This is less than ideal from an economic perspective, however. Widgets will have an effective price of \$90, which would, as before, lead to too many widgets being produced and disposed of and inadequate incentives for manufacturers to produce better widgets. If widget recycling causes environmental harm, an effective price of \$90 would also cause too much widget-related pollution.

Turning to incentive-based mechanisms, an MTC of \$35 per widget entering the trash stream is one possibility. It is true that a \$35 MTC would motivate households to recycle used widgets in order to avoid the trash charge. But such an MTC would be less than ideal, since the effective price of widgets would still be \$90.³ Too many widgets would be produced, widget recycling-caused external costs would be too high, and incentives to produce widgets that are cheaper to recycle and/or be less polluting would be inadequate.

² Remember that households may still ultimately pay for these services through property or other taxes or other *indirect* means that do not depend on widget consumption and disposal. The important thing when considering incentives is the *direct* charges associated with disposal of an individual widget in the trash or the recycling.

³ The effective price is not \$125, since consumers will use the option of recycling in order to avoid the charge and we assume (per footnote 2) that the recycling fee is paid by property or other taxes.

Nor would a \$20 RC (recycling charge) per widget help if applied alone. This would only encourage households to put used widgets in the garbage.⁴

So, once recycling is brought into the discussion, two or more incentive-based mechanisms would be needed to get the price right. One solution would be to combine an MTC of \$35 per widget to discourage households from putting them in the trash with an RC of \$20 to make the effective price \$125 for disposal and \$110 for recycling. The consumer could thus choose between these two offerings of the marketplace. Another possibility would be a deposit-return system, which boils down to a combined ADF and RC. A deposit (ADF) of \$35 per widget could be collected at the time of purchase and a recycling refund (a negative RC) of \$15 could be paid when widgets are returned for recycling. The effective price would then be right at \$110 for those that recycle and \$125 for those that decide to dispose in a landfill.

Moving toward the real world quickly highlights some limitations of the framework as it has been laid out so far. First, as noted above, at least for now, we in the US have a lot to learn about the dollar magnitudes of external costs of alternative waste disposal strategies. This means that there is an inadequate basis for determining dollar values for ADFs, MTCs, and RCs. If we tried to reach the economic ideal, we would not have the information needed to do so.

In addition, the simple economic models of waste generation and disposal explored here have a hidden assumption that is likely to be unrealistic. We have implicitly assumed that all households are identical in terms of how they choose between putting their used widgets in the trash and the recycling. There is ample evidence that households (and firms) are not homogeneous in this regard.

Consider the success of voluntary recycling programs. That many people recycle voluntarily is an economically interesting phenomenon. It seems likely that recycling involves costs at the household level above and beyond the costs of simply putting materials in the garbage. There may be out-of-pocket costs for separate receptacles, for example. Additional costs may include the extra time and energy required to recycle, compared to the time and energy required to simply toss recyclable items in the trash. In concept, the household cost of recycling a given amount of waste material would equal the minimum payment required to get a household to recycle the amount in question. In practice, this may not be easy to measure, but it's what we are looking for in principle.

The success of voluntary recycling means that many people must be getting a direct positive benefit from the act of recycling that outweighs their household costs. If a household voluntarily recycles, its members must be receiving a benefit from doing so that exceeds the costs in terms of dollars, time, and energy required to separate and otherwise attend to recyclables. Some may gain satisfaction from knowing that they are helping out the environment. Some may feel that recycling helps to counterbalance the American way of life, which they feel is wasteful. Whatever its reasons, a household that voluntarily recycles in the absence of monetary rewards for doing so must be getting a positive net benefit.

⁴ So long as illegal dumping is ruled out by assumption, a landfill ban on widgets would correct this part of the problem. Once illegal dumping is admitted into the discussion, however, a landfill ban might be violated by some consumers.

At the same time, we know that households vary a lot in their willingness to participate in voluntary recycling programs. The economic interpretation of this fact is that households vary in terms of their costs and/or benefits from recycling. This has a profound implication for designing ideal incentive-based systems: the “right” price for one household, say one that recycles a lot in a voluntary program, would be different from the “right” price for one that does not. RCs would need to be tailor-made for each type of household. If households are quite heterogeneous, this sort of logic would quickly lead us beyond what is practical. The economic ideal would not be attainable in the real world.

The physical heterogeneity of the waste stream itself further limits the applications of incentive-based schemes. Solid waste streams from one household or firm may be very different from that of another in volume, weight, and potential for generating external costs. It may never be cost effective to try to recognize the mishmash of materials entering the waste stream. If so, a single MTC or RC for all households or firms is likely to be less than perfect in recognizing the heterogeneity of wastes from different sources. This is not so say that no adjustments are possible. Heterogeneity may tip the scales in favor of ADFs over MTCs, other things being equal, since ADFs are collected before items have a chance to enter the waste stream. Product specific MTCs are likely to be most workable when the item in question is easily observed by those outside the household or firm. Opportunities to design around the physical heterogeneity of the waste stream are likely to be limited in the real world.

Other practical impediments to full implementation of incentive-based mechanisms could prove important. For example, the net social costs of waste disposal alternatives are likely to vary geographically. Hence ADFs levied against manufacturers may be infeasible if they operate in many different regions of the country. ADFs levied against consumers at the point of purchase may be of limited usefulness if they dispose of items at home that have been purchased in other regions or over the Internet. In sum, social costs vary by geographical area, and it is a challenge to impose charges on manufacturers that are located outside Wisconsin.

If illegal disposal is costless or nearly costless to waste generators, then an MTC or a positive RC may inadvertently lead to an increase in the net social costs of waste disposal through the externalities associated with unsightly or even unhealthy litter and the high costs of collecting dispersed litter. One command and control solution is anti-litter laws with fines for littering. The litter that confronts us at every turn bears ample witness to the limitations of this approach, as does the infrequency of conviction of people who litter.

Incentive-based mechanisms for dealing with litter do exist as an alternative, at least in theory. Falling back on our widget example, consider a three part scheme: 1) An ADF could be set equal to the net social cost of a widget that ends up as litter, plus 2) a negative MTC (a trash refund) could be set equal to net social cost of litter minus the net social costs of landfilling, plus 3) a negative RC (a recycling refund) could be set equal to net social cost of litter minus the net social cost of recycling.

Such a system seems quite complicated for real world applications. Porter (2004) notes several additional potential problems. By the time ADFs are collected and refunds are paid, a lot of money will need to be moved around. The administrative costs could be substantial. This is made all the more complicated if manufacturers operate on the national or international economic stage while the net social costs of landfilling, recycling, and littering vary on a regional basis. Furthermore, refunds encourage waste and create incentives to discard things rather than use them longer. And finally,

such a system may run counter to democratic values. We tend toward expecting good, responsible behavior and penalizing bad behavior. Paying people not to litter would rub some Americans the wrong way. So, once again the economic ideal seems unattainable.

With so many limitations (and more that could be listed), what good are these ideas about incentive-based mechanisms? Admittedly, economics does not have all the answers. However, the framework we have just laid out can be helpful in thinking about new ways to address issues of solid waste recovery and disposal. It can also help anticipate economic pitfalls in proposed and actual strategies for dealing with solid waste. Let's consider some of the issues that have confronted the task force and see what economics has to offer.

Fees for Garbage Pickup Based on Volume and Other Measures of Waste

More than 200 communities, prior to 2000, had special grant status to implement "pay as you throw" programs. The details varied from community to community and included prepaid bags, tags, and other such devices, variable prices for trash pickup where households paid depending on the size of the trash containers they chose, weight based systems, and other devices (Gruder and Brachman 2000). Since households (and in a few cases businesses) paid based on how much trash they put out, this is a form of MTC. Households have monetary incentives to reduce their trash and recycle more. Interestingly, the communities using these systems tended to be among the smaller ones in the state. In addition to discouraging waste and encouraging recycling, Gruder and Brachman (2000) see another advantage: such systems are often seen as fair in the sense that those who generate more trash pay more.

Gruder and Brachman (2000) could not find a statistically defensible effect of volume based fees on garbage volumes. Perhaps this should not be surprising given such a diverse set of strategies and fee levels. Additional study might be able to isolate effects on trash volumes and trace them to specific program characteristics. In the meantime, a number of positive features were identified through a survey of the communities involved. Program managers from an overwhelming number of responsible units reported substantial amounts of citizen support for volume based fees. Eighty percent reported no increases in illegal dumping. Half the programs experienced no appreciable increases in workloads of public workers as a result of implementing volume based fees and another 9% reported reduced workloads. Hence, the costs of implementation may well be reasonable.

Porter (2004) summarizes evidence from studies in the U.S. showing that bag charges sometimes do significantly reduce the amounts of materials that end up as trash and increase recycling. He suggests based on existing studies that it would not be unreasonable to expect a 25% reduction the wastes going into landfills from bag charges in the range currently being applied. If littering and administrative costs are ignored, under plausible assumptions, a back-of-the-envelope exercise indicates that such a charge would have national net benefits of around \$2.4 billion per year (Porter 2004, p. 119). Only one study of administrative costs appears to be available (Fullerton and Kinnman, 1996) and it raises doubts about whether net benefits would be positive after allowing for administrative costs. However, that study did not consider the benefits of recycling and composting (OECD 2006, p.11). Further studies are needed on this issue. Results so far on littering are mixed with several studies, cited in Porter (2004), concluding that increased littering is not a serious problem.

It also needs to be noted that residential waste generation – for all the attention it receives from policy makers – is a relatively small portion of the waste stream going to landfills. In Wisconsin, for example, it comprises only about 16% of the landfilled material. Thus, programs will need to address the issue of waste generation from small and large commercial businesses, and manufacturers, especially the larger generators.

From the DNR's report on the total amount of material deposited in landfills in 2001, municipal solid waste generation was 4.8 million tons, which includes residential waste. High volume industrial waste landfilled was 1.5 million tons, sewage sludge landfilled was 0.1 million tons, other waste was 1.5 million tons, while waste used for daily cover, roads, berms and dikes was 1.4 million tons, for a total landfilling of 9.3 million tons. Obviously, the totals vary by the amount of out-of-state waste that gets included in the mix.

Research on MTCs in other countries shows that they have a lot of promise and add to the case for considering them for a bigger role in Wisconsin. A particularly interesting report has recently been published by OECD (2006). Detailed case studies in Spain, Germany, and Belgium showed that economic benefits of MTCs rather consistently exceed costs. Though benefits and costs were not calculated for South Korea and Denmark, some effects of MTCs in those countries were also presented. General conclusions about the impacts on the waste streams in all these countries are difficult to derive because their approaches tend to involve complicated systems of separation of materials.

For example, in the Spanish municipality that was studied, kitchen and garden waste is collected separately three times a week for free; paper and "card" are collected once per week for free; glass is taken to a centralized collection site and can be disposed of there without charge; all other wastes (mainly packages and "residuals") are collected in special bags once per week with different fees for bags of different sizes (except that "nappies" have their own bags!). Anyway, the bag charge was estimated to have reduced residual waste in this Spanish community by 38% and increased the separately collected materials by from 33% to 89% depending on the category. The other case studies showed somewhat similar results. The report does suggest that illegal disposal is not well documented and that household costs for dealing with waste streams have not been studied.

Based on these results, the Task Force recommends that Wisconsin consider bag fees and other MTCs.

Tipping Fees

There has been much discussion of raising tipping fees in Wisconsin of late. Without going into specific issues such as interstate shipments of trash, it is interesting to think about tipping fees as a possible incentive-based mechanism. Theory would predict that trash collectors and haulers would respond to increased tipping fees by seeking alternative waste disposal strategies such as increased recycling. If one believes that the net social costs of landfilling are higher than net social costs of recycling, this is an economically desirable outcome. But it remains to be investigated whether, to any great extent, changes in tipping fees actually find their way into the incentives that influence the behavior of households, firms, governments, and other institutions that generate the trash. It is even farther up the waste stream to manufactures and the incentives they face in designing products and associated packaging that ultimately end up in the waste stream.

Recent experience in the UK may provide some insights. Beginning in the mid 1990s, the UK has levied a landfill tax—in our terms, additions to their landfill tipping fees—that has increased substantially over the years (Davies and Doble 2004). Interestingly, officials there were able to make at least a first cut at addressing the waste heterogeneity problem by setting separate taxes on inactive and active (i.e., biodegradable) wastes. At the outset, a study was done to estimate the net social costs of landfill disposal. The tax was set based on the results of that study. Over the years, however, there was a growing conviction on the part of officials that the tax was not providing sufficient incentives for seeking alternatives to landfilling. One interpretation would be that they found attempts to estimate net social costs inadequate. So, they departed from setting the taxes based on estimated social costs and instead set the taxes to achieve targets for reducing the share of the waste stream entering landfills.

As for evaluating the results of the tax, as of the writing of the paper by Davies and Doble (2004), the jury was still out. On the one hand, the amount of inactive wastes such as building materials going to landfills had declined as reuse and recycling increased. Perhaps the landfill tax gave this trend a boost. On the other hand, the amount of organic wastes entering landfills had remained rather stable despite steeply escalating taxes. Davies and Doble called for further tax increases. Monetary incentives might be more effective, however, if they could more directly affect the pocketbooks of those deciding what to consume, how to treat resulting wastes, and how to design products and packaging.

The question of tipping fees is a complex one. Issues such as importation of waste into the state and funding recycling programs are important. However, it appears to us at this point that tipping fees may not be very promising as an incentive-based mechanism for influencing the allocation of Wisconsin's waste stream between landfills and recycling.

Deposit-Refund Systems

Gitlitz (2005) reports that for the U.S. as a whole, two-thirds of beverage containers are not making it into the recycling stream. Wisconsin is doing better at 30-50 percent, but even here tons of recyclable beverage containers are ending up in landfills each year. The rapid increase in the popularity of plastic containers is adding to the avalanche of trash. And it does not have to be that way. Michigan, for example, charges a deposit of 10 cents per glass and aluminum containers which is refunded when containers are returned and gets 95% recovery. Gitlitz (2005) reports that, across the country, states with deposit-refund systems consistently get much higher rates of return. Other reports note that the quality of the material recovered with deposits is better than the quality recovered with curbside collection, especially single-stream collection. Several recycling industry associations have come out in favor of deposits to increase both the quantity and quality of recyclables. This is clear evidence that incentive based systems can influence waste disposal.

As noted in the Task Force recommendations, the successes of container deposit-refund systems in other states should encourage Wisconsin to consider such a system for glass and aluminum beverage containers. Indeed, other materials might also be amenable to such a system. An obvious extension would be to PET containers that have become so popular for water and other noncarbonated

beverages (Franklin 2006).⁵ Fullerton and Raub (2004) summarize the literature so far on deposit-refund systems and it is safe to say that environmental economists consider them to be promising. Nevertheless, additional economic study would be helpful. Some studies have made solid progress toward assessing the benefits and costs of beverage container deposit-refund systems (Morris, 1998; BEAR, 2002), but there is still much to learn. The primary benefits are increased recycling rates and reduced littering. The primary costs include the net social costs of recycling the materials collected and the costs of collecting the containers in this way including the costs of administering the funds collected and dispersed. Additional economic questions arose during task force deliberations relating to the fiscal implications of a deposit-refund on the existing recycling systems of Responsible Units.

Furthermore, it should be recognized that deposit-refund systems do little toward aligning beverage prices with the full net social costs of container disposal. This suggests a modification. Why should the deposit and return be equal? Why not charge a deposit (in our terms here, an Advance Recycling Fee) that exceeds the refund by the net social costs of recycling? Where those costs are negative, as they may well be for aluminum containers, the refund could actually exceed the deposit. See Fullerton and Raub (2004) for further discussion.

Extended Producer Responsibility

This is a term that has many definitions. It arises out of recognition that traditionally product manufacturing and packaging have been completely divorced from what happens to packaging once the product is delivered to consumers and, later, what is done to deal with used products. The idea is that if manufacturers could be made responsible for recycling and/or disposal of packaging and the used products they produced, they would design products and packaging with future recycling and disposal costs in mind, along with incorporating the cost of this management into the price paid for the product, both affecting the buying decision of the consumer and removing the cost from many municipal budgets.

A broad definition of producer responsibility might include an ADF levied on manufacturers to cover the net social costs of recycling or disposal. We will use a narrower definition here. “Full” producer responsibility systems as the term is used here would make manufacturers directly responsible to assuring that the packaging they use and the used products they originally manufactured are properly disposed of through recycling, landfilling, or incineration. They might do this directly through so-called “producer take-back systems” where each manufacturer is directly responsible for collecting the products it sells and associated packaging. It also includes systems where a group of manufacturers contracts with waste hauling and recycling firms to deal with their wastes. “Partial” producer responsibility systems might only extend to products or packaging, but not both.

Producer responsibility systems under this definition have economic potential. As companies come to grips with their extended responsibilities, they will have to absorb associated costs for materials recovery and disposal. This should move the prices they charge for their products in the right

⁵ Currently, only two states, California and Maine have beverage container deposit-refund systems that extend to plastic bottles. [From an e-mail note from Pat Franklin on 9 Oct 2006, all 11 states’ laws cover plastic bottles for carbonated beverages and beer. However, only CA, ME and HI cover non-carbonated and non-alcoholic beverages. ME’s law also covers wine and liquor sold in plastic.]

direction, thus encouraging innovation and bringing consumption more into line with what is economically justified. However, to the extent that producers must only meet the financial costs of recycling or disposal, not enough will be done in terms of product and packaging design to bring prices fully into line with the net social cost of recycling or disposal. Supplementary command and control strategies would need to focus on what exactly is meant by “proper” recycling or disposal, i.e., recycling or disposal in a manner that reflects external as well as financial costs.

An additional economic issue arises: will an extended producer responsibility system be the most cost effective way to assure proper recycling or disposal in particular interest? Such a system by definition requires treating the waste stream from each manufacturer’s products separately from the more general waste stream or, where manufacturers band together to contract with waste handlers, treating their combined waste streams separately. Extended producer responsibility is likely to be most economical when products are easily separated from the general waste stream, where resulting recycled materials are especially valuable, or where external costs are large. Consumer electronics are commonly thought to be promising for these reasons. The extent to which other product classes will fit these requirements remains to be investigated.

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