

# Incentives for Industry

## Stimulating Waste Reduction, Pollution Prevention, and Increased Secondary Materials Use in Washington Industry



Photos by Chris Jordan

**Final Report**  
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# Table of Contents

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<b>Executive Summary</b> .....	<b>1</b>
<b>1. Introduction and Background</b> .....	<b>5</b>
INCENTIVES – WHAT ARE THEY? .....	6
<b>2. Methodology and Strategic Considerations</b> .....	<b>7</b>
STRATEGIC CONSIDERATIONS .....	8
<b>3. Incentive Recommendations</b> .....	<b>11</b>
RECOMMENDATION #1: INVEST IN BEYOND WASTE INNOVATION .....	13
RECOMMENDATION #2: CREATE A “GREEN TRACK” PROGRAM TO REWARD BUSINESSES THAT PURSUE BEYOND WASTE PRACTICES .....	21
RECOMMENDATION #3: PURSUE HAZARDOUS WASTE TAX AND POLICY REFORM .....	29
RECOMMENDATION #4: SUPPORT LONGER-TERM CHANGES TO MATERIAL MARKETS .....	34
RECOMMENDATION #5: INSTITUTIONALIZE AN INCENTIVE APPROACH AT ECOLOGY .....	38
POSSIBILITIES FOR FUNDING INCENTIVE INITIATIVES .....	41
<b>4. Roll-Out Strategy</b> .....	<b>43</b>
SHORT-TERM ACTIONS (0 TO 1 YEAR).....	43
NEAR-TERM ACTIONS (1 TO 3 YEARS).....	44
LONGER-TERM ACTIONS (3+ YEARS) .....	45
CONCLUSION.....	46
<b>5. Appendices</b> .....	<b>49</b>
<b>Appendix A. Incentive Descriptions</b> .....	<b>51</b>
<b>Appendix B. Incentive Assessment Criteria</b> .....	<b>61</b>
<b>Appendix C. Summary Incentive Ratings</b> .....	<b>63</b>
<b>Appendix D. Summary of Stakeholder Perspectives</b> .....	<b>65</b>
<b>Appendix E. Lessons from Environmental Economics</b> .....	<b>83</b>
<b>Appendix F: National Research Methodology and Key Results</b> .....	<b>107</b>
<b>Appendix G. Incentives Matrix</b> .....	<b>111</b>
<b>Appendix H. Final Presentation</b> .....	<b>113</b>
<b>6. Works Cited</b> .....	<b>115</b>

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# Executive Summary

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The Washington State Department of Ecology has embarked on a long-term effort to move the state *Beyond Waste*. Together with stakeholders and the public, the Department of Ecology (Ecology) has advanced the vision:

“We can transition to a society that views wastes as inefficient uses of resources and believes that most wastes can be eliminated. Eliminating wastes will contribute to environmental, economic and social vitality.”

Guided by this vision, Ecology has been researching various approaches to reduce or eliminate the variety of waste streams in the state. In its final *Beyond Waste Plan*, published in November 2004, Ecology identified that one of its initiatives will be to focus on Washington industries, as industry generates most of the hazardous waste in the state, generates a significant fraction of the solid waste disposed, and – in the interest of competitiveness – is already experiencing significant momentum toward *Beyond Waste* practices.

Ecology is particularly interested in exploring incentives as tools to encourage industry to reduce waste, prevent pollution, and increase use of secondary or recycled materials in production processes. Accordingly, the agency retained a team of consultants – led by Cascadia Consulting Group – to research and recommend what incentives have worked elsewhere, would be particularly likely to achieve results, and would attract a critical level of support from stakeholders. While the task of balancing economic, political, environmental, and social outcomes is not easy, the desired outcome of this project has been a collection of incentives that will foster positive, system-wide impacts and create lasting change in Washington’s materials economy – change that improves business competitiveness, protects the environment, and improves communities.

Based on their research, analysis, stakeholder involvement, and strategic considerations (all detailed in the full report), the consultant team makes the following recommendations.

## #1. INVEST IN BEYOND WASTE INNOVATION

Innovative Washington businesses seek out ways of reducing waste and pollution. To accomplish these innovations, businesses may need new designs, processes or product applications. In some cases, however, companies may be limited by lack of suitable technologies, technical information, or access to capital. This initiative seeks to remove these barriers and facilitate “Beyond Waste Innovation” by having Ecology:

- **Collect and distribute information on material and energy flows in Washington.** Successful exchange of byproduct or “waste” materials relies on information about what and where materials are available. Expanding the depth and scope of information collected and offered would help industry innovate, develop new processes, and exchange and use secondary materials.
- **Improve and expand Washington’s materials exchange program.** Beyond information and maps, an online tool can greatly facilitate material transactions by providing an up-to-the-minute “store” of what materials are for sale or wanted-to-

purchase. The existing regional materials exchange, IMEX, can be improved by increased promotion and a more active facilitation of exchanges, either through commission-based sales by a private broker or by increased government staff involvement.

- **Establish a Beyond Waste Innovations program at Ecology.** We recommend that Ecology staff develop capabilities in “industrial ecology”; clearly identify problem wastes or materials in – and the “Beyond Waste potential” of – each industry sector in Washington; and work closely with each industry sector to identify opportunities, particular technical hurdles, and possible pilot projects or experiments.
- **Provide funding opportunities for Beyond Waste innovation.** We recommend that Ecology and the State provide grants to State universities for R&D projects devoted to overcoming specific technical hurdles, offer “golden carrots” (cash prizes or market subsidies) for development of new, breakthrough Beyond Waste technology, and/or facilitate low-interest loans to fund capital investments needed for Beyond Waste improvements.

## **#2. REWARD BUSINESSES THAT PURSUE BEYOND WASTE PRACTICES WITH REGULATORY BENEFITS**

We recommend that Ecology establish a “Green Track” program to reward businesses for superior environmental performance. Through the “Green Track” program, Ecology can:

- **Expand EnviroStars statewide to provide increased recognition for businesses achieving Beyond Waste.** We recommend that Ecology work with local governments to expand the existing EnviroStars program statewide. The EnviroStars program rewards business with a two-to-five star rating based on their commitment to pollution prevention and reducing hazardous waste. The program also publishes an online directory of these businesses. Businesses participating in EnviroStars could also receive regulatory benefits.
- **Implement an Environmental Results Program (ERP) for small business.** The ERP would replace or offer an alternative to state permitting for certain industry sectors with environmental performance standards and annual certifications of performance. In other states, businesses that use ERP self-certification have been shown to be successful at reducing hazardous waste.
- **Offer a B&O tax credit for increased use of recycled materials in production processes.** B&O tax credits could be offered to businesses that increase their use of secondary materials in their Washington manufacturing facilities.

## **#3. INCREASE THE INCENTIVE EFFECT OF THE CURRENT HAZARDOUS WASTE FEE SYSTEM AND ASSOCIATED POLICIES**

Washington currently has two hazardous waste fees and one tax on hazardous substances. Although these fees and taxes provide a useful source of revenue to fund particular environmental programs at the state and local level, the incentive effects of the instruments – i.e., the extent to which they lead to environmentally beneficial changes in behavior – could be greatly improved. In particular, we recommend:

- **Eliminate the Hazardous Waste Education Fee.** The Hazardous Waste Education Fee provides no incentives for industry to make changes to reduce hazardous wastes. It is a pure revenue-raising instrument. Moreover, eliminating the fee could reduce administrative costs for the state and for the affected firms.
- **Phase Out the Caps On the Hazardous Waste Planning Fee.** Unlike the Education Fee, the Planning Fee is assessed per pound of hazardous waste generated. Therefore, in theory, the more pounds of waste generated by a facility, the higher the fees that facility will pay. Unfortunately, because the state caps the amount that any individual facility must pay, this effect does not strictly hold. The reality is that a small number of capped facilities (10%) produce the vast majority (90%) of the hazardous wastes generated in the state each year.

Not only is there an inequity in the way that the fee system is set up – the capped firms paid \$1.95/ton in 2002 while the uncapped firms paid nearly \$75/ton – there is a serious lack of incentives facing the high-polluting firms. Once they know that their waste volumes for the year have reached a high enough level that their fee payments are capped, they have no incentive to try and reduce wastes since they reap no financial reward for doing so.

- **Change the Hazardous Waste Planning Fee Structure to Reward Good Waste Management Practices.** We suggest that the Hazardous Waste Planning Fee vary based on the waste management method chosen – higher fees for less benign methods and lower fees for more benign methods. Oregon, Minnesota, New York, Oklahoma, and Pennsylvania all have similar systems.
- **Change the Hazardous Substance Tax from a Percentage of Value Basis to a Per-Pound Basis.** The environmental risk posed by a quantity of substance depends not on its market value but instead on the quantity and its inherent hazard or chemical makeup. Changing the Hazardous Substances tax to a per-pound basis – and perhaps having that tax vary by material based on relative risk – would significantly improve the incentive properties.
- **Examine How to Remove the Discrepancy in Hazardous Substance Tax Paid by Petroleum and Non-Petroleum Products.** Petroleum products currently account for approximately 85% of all revenues raised by the Hazardous Substance Tax. Although petroleum products undoubtedly cause harm to the environment, the incentives provided by the Hazardous Substance Tax should probably be focused on other hazardous substances. We recommend that Ecology and the Department of Revenue study how to more clearly focus the Hazardous Substance Tax on highly hazardous substances while still maintaining the same level of revenue.

#### **#4. SUPPORT LONGER-TERM CHANGES TO MATERIAL MARKETS**

In the long term, the most transformative incentives are likely to be those that create fundamental changes in the way materials are produced, used, bought, and sold. Ecology action to support the following initiatives – all of which already have momentum – will yield long-term dividends:

- **Support cap and trade programs for greenhouse gas emissions.** Ecology should work with other agencies to explore how to accelerate adoption of greenhouse gas cap and trade programs and investigate means to procure

greenhouse gas credits for practices that – in addition to reducing greenhouse gasses – also reduce waste, pollution, or use of virgin materials.

- **Promote and implement resource management contracting.** Using resource management (RM) contracting, waste management firms are compensated based on success at reducing waste rather than on the quantity of waste disposed. We recommend that Ecology adopt RM contracting for its own facilities and include information on resource management contracting in its existing education and technical assistance efforts.
- **Facilitate adoption of product stewardship approaches** in which industry takes significant responsibility for the full life cycle of the products they manufacture and/or sell.

## **#5. INSTITUTIONALIZE AN INCENTIVE APPROACH AT ECOLOGY FOR BEYOND WASTE**

Ecology's existing relationship with industry is one based primarily, although not exclusively, on regulation. Given the current business and political climate, Ecology may find success working directly with the business community to identify problems and develop incentive-based approaches on an industry by industry basis. In particular, we recommend that Ecology:

- **Examine ways that internal resources (staff and budgets) can be reallocated to focus more strongly on incentives.** Our research indicates that incentive-focused agency-industry partnerships will be effective, but that new approaches within Ecology could speed up the process and facilitate trust within industry.
- **Develop a process to share responsibility with specific industries for developing incentives for specific problems.** Ecology should establish a "design and build" process to work with specific industry sectors to identify and solve waste and pollution-related problems.
- **Adapt the agency's administrative procedures for rule-making to incorporate incentive approaches.** Ecology has recently undertaken stakeholder processes in support of rule-making for chemical phase-outs, such as PBDE fire retardants. We recommend that future processes also consider incentives to achieve the desired outcomes.

Whether intentional or not, a variety of forces in the economy – from federal virgin material subsidies to lack of access to new information or technology – can inhibit industry from using recycled materials, reducing waste and pollution, and making other environmental gains. This project has sought to "level the playing field" by introducing new incentives, or removing existing disincentives, to encourage environmental improvement. Our conclusion is that the above collection of recommendations, if implemented, will stimulate substantial change in Washington's material economy and result in waste reduction, pollution prevention, and increased use of secondary materials.

Please see the full report for a full discussion of each recommended initiative, as well as further discussion of the consultant team's methodology and research.

# 1. Introduction and Background

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Early this decade, the Washington State Department of Ecology launched a bold effort to move the state *Beyond Waste*. Motivated by the continual increase in solid waste disposed (despite recycling efforts) and the continued presence of toxics in humans and the environment, Ecology began a long-term process to significantly reduce waste and toxics in Washington's economy. Together with stakeholders and the public, Ecology advanced the following Vision for its Beyond Waste effort:

“We can transition to a society that views wastes as inefficient uses of resources and believes that most wastes can be eliminated. Eliminating wastes will contribute to environmental, economic and social vitality.”

To date, the work has included extensive research, analysis, and stakeholder involvement, as well as the development of the Final Beyond Waste Plan – released in November, 2004 – for accomplishing the Vision (Ecology, 2004).

The Final Beyond Waste Plan contained five key initiatives to begin the transition to Beyond Waste. One of these five key initiatives concerns *Moving Toward Beyond Waste with Industries*: reducing waste and pollution and increasing use of recycled materials in Washington Industry.<sup>1</sup> Moving to Beyond Waste with industry is expected, in the long term, to significantly decrease waste management costs and thereby strengthen the financial position and competitiveness of Washington industry.

Ecology has an existing track record of working with industry on waste management issues, particularly related to hazardous waste. Current efforts include a variety of regulatory, technical assistance, and planning activities. For example, Ecology requires hazardous waste generators to manage and track their hazardous wastes, and many generators are required to prepare pollution prevention plans and submit annual reports. Ecology also conducts enforcement inspections to ensure compliance with both state and federal regulations, and the agency offers technical assistance to help businesses prevent pollution and effectively manage their wastes.

Despite Ecology's existing efforts, government and industry stakeholders agree that improvement is possible – if the right conditions, or incentives, are in place. Whether intentional or not, a variety of forces in the economy – from federal virgin material subsidies to lack of access to new information or technology – can inhibit industry from using recycled materials, reducing waste and pollution, and making other environmental gains. This project has sought to “level the playing field” by introducing new incentives, or removing existing disincentives, to encourage environmental improvement.

The overarching goal of this project is to develop incentives that will reduce waste and pollution, reuse materials and components, and decrease use of virgin feedstocks in favor of recycled materials.

Depending on the issue and perspective, stakeholders call for a variety of changes, from significantly reduced regulatory burden to increased use of bans on very toxic materials, from increased access to capital to new pollution taxes.

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<sup>1</sup> Moving Towards Beyond Waste with Industries is the first of five initiatives presented in the Plan. The other four initiatives are (2) Reducing Small-Volume Hazardous Materials and Wastes; (3) Increasing Recycling for Organic Materials; (4) Making Green Building Practices Mainstream; and (5) Measuring Progress Towards Beyond Waste.

This project has sought to find effective incentives – tools that have worked elsewhere, have a high probability of success in Washington, and that are likely to have some level of stakeholder support. While the task of balancing economic, political, environmental, and social outcomes is not easy, the desired outcome of this project has been a collection of incentives that will foster positive, system-wide impacts and create lasting change in Washington’s materials economy – change that improves business competitiveness, protects the environment, and improves communities.

## INCENTIVES – WHAT ARE THEY?

The *American Heritage Dictionary* defines an incentive as “something, such as the fear of punishment or the expectation of reward, that induces action or motivates effort.” In government policy discussion, however, incentives are sometimes considered and promoted as alternatives to regulation, with a focus on rewards rather than punishment. In this effort we take a hybrid approach. We have looked first at incentives that offer rewards for “doing the right thing,” but we have remained open, as several stakeholders have encouraged us to do, to regulatory approaches where they are clearly warranted. We have also looked at places where there are current disincentives that could be removed.

Using incentives to encouraging environmental improvements can be successful. In general, government incentives work best when they reward actions that have already experienced some initial momentum. In other words, where industry innovation has started a trend or produced a particularly efficient or effective solution, government rewards can help speed up adoption or dissemination of the practice and result in significant system-wide improvements. In contrast, government rewards aren’t as effective at creating change “from scratch” (Marian Chertow, Yale University, personal communication, April, 2005). Other types of incentives, such as mandates, can be more effective in these cases – but resulting gains can come at varying degrees of economic and political cost.

As stated in the sidebar box on page 5, the overarching goal of this project is to develop incentives that will encourage industry to:

- reduce waste and pollution;
- reuse materials and components; and
- decrease use of virgin feedstocks in favor of recycled materials.

Given the vast array of materials and wastes currently present in Washington’s economy, a detailed look at all possible incentives and all waste and materials would be an enormous undertaking – and beyond the scope of this project. Incentives could be applied to almost any material or waste in Washington, but the focus of this effort is on *industry*. In consultation with the Department of Ecology, we defined our focus to be primarily on Washington’s manufacturing and resource-producing sectors (e.g., pulp and paper, aerospace, electronics, chemicals and allied products, food processing) as well as business sectors that produce hazardous waste. Furthermore, the short timeline of this project necessitated a very focused approach to quickly identify high-probability incentives, discuss them with stakeholders, research how they would work in Washington, and “tee them up” for action.

## 2. Methodology and Strategic Considerations

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Due to the short timeline of this project, our team quickly identified incentives likely to work in Washington and then conducted further analysis to assemble recommendations. In particular, our initial research focused on identifying incentives that have worked elsewhere and evaluating them in relation to the business and policy climate within Washington State.

- 1. What has worked elsewhere?** We focused both on lessons from other states as well as theoretical models gleaned from the academic and economic literature.
  - Lessons from other states. Tellus Institute, with assistance from Marian Chertow, Professor of Industrial Environmental Management at Yale University, conducted a focused literature scan and internet search of state-level incentives from throughout the country. Northwest Environment Watch also contributed potential models from their extensive work on environmental policy.
  - Economic perspective. Margaret Walls of Resources for the Future synthesized and distilled the academic and economic literature on incentive policies. Please see Appendix E for her summary papers.
- 2. What are the barriers, trends, and opportunities for incentives in Washington's business and policy climate?** Cascadia Consulting Group, with assistance from Evergreen Recycling, ECOSS, Sound Resolutions, and Northwest Environment Watch researched the local business and political climate to identify incentives with potential for effectiveness and political support in Washington.

These research tasks gave our team a full pallet of possible incentives to apply in Washington. After considering over one hundred possible incentive policies, the consultant team narrowed the list to 20 options (Appendix A). These 20 were evaluated further to determine their environmental and economic benefits, cost-effectiveness, political and technical viability, and degree of equity achieved. This evaluation was completed while considering different types of business and communities within the state and applying the "polluter pays" principle.

Our next steps were to:

- 3. Assess incentives based on political and technical feasibility, likely impact, and equity concerns.** This qualitative assessment provided the basis for understanding the relative strengths and weaknesses of the different options and for ranking some as clearly preferable to others when environmental, economic, community, and political factors were considered. More importantly, however, the assessment provided the framework for assembling strategic combinations of incentives that together could be more effective, efficient, feasible, and equitable than any incentive implemented individually.

- 4. Develop recommended incentive packages.** Based on the analysis above, our team assembled recommended incentive packages and further developed them into proposals.

Our team conducted the above four-part process in an iterative manner. We attempted to consider the likely effects that incentives might have on each other as well as on the overall systems they are intended to transform. In addition, we paid particular attention to strategic considerations likely to affect effectiveness and feasibility of the incentives considered.

## STRATEGIC CONSIDERATIONS

For incentives to function effectively, they must act on and amplify existing trends in industry and the larger economy – they cannot be created in or act in a vacuum disconnected from the larger economy. Accordingly, the following findings guided our recommendations. These findings were gleaned largely from our interviews and discussions with stakeholders, as well as the collective policy-making history of our team.

- 1. This is a good time to pursue new approaches to achieving environmental outcomes, such as the Beyond Waste vision.** Most key stakeholders are interested in alternative approaches and are willing to discuss how they might work. The idea of voluntary incentives is well received, particularly by the regulated business community.<sup>2</sup> Furthermore, Washington Governor Gregoire is said to be interested in new ways to solve environmental problems and the legislature is interested in solutions that include performance and accountability measures.
- 2. That said, different stakeholders have very different perspectives on the relative merits (or lack thereof) of specific incentive proposals.** In some cases, stakeholder support will be contingent on program specifics (i.e., “the devil is in the details”). In other instances, what works for one stakeholder group does not work for another. For example, larger businesses generally favor B&O tax credits, whereas smaller businesses report that the costs of paperwork requirements often exceed the benefits of the tax credit. Moreover, the environmental community expressed concern that incentives don’t “give away the store” and that businesses remain accountable. So while there is general agreement that incentives are a good thing to pursue, very few incentive policies receive universal support from all interested parties.
- 3. As Ecology moves forward with implementing its Beyond Waste plan, it is important to have early successes to build momentum and support both within government and among affected stakeholders for Beyond Waste.** This imperative for an “early success” applies to incentives as well. **Ideally at least one incentive policy should be able to be implemented in the short term with strong stakeholder support** and that incentive should demonstrate measurable impacts in the near term.
- 4. Incentives that include a tax increase or represent a significant policy change, and therefore require legislative approval, will be more difficult to implement.** Legislative reluctance to raise taxes or approve major policy

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<sup>2</sup> The Washington business community has expressed less receptivity towards mandatory approaches.

initiatives without strong stakeholder consensus is a key constraint on Ecology's pursuit of incentive policies. Accordingly we focused on identifying ways that Ecology might move forward with an incentives approach internally – with no legislative approval needed – as well as identifying incentives that would require legislative action and so be appropriate for the longer term.

5. This project focused on identifying and developing incentive policies from a whole systems perspective: that is, to find incentive policies that could influence entire supply chains and material flows associated with a cross section of private sector economic activity. The consultant team did identify such policies and these are presented in this report. However, **feedback from stakeholders suggests that incentives that are targeted to specific industries, material flows, and/or wastes are likely to be better received, and possibly more effective, than those that are more general in impact and scope.** Accordingly it may make sense for Ecology to have an “incentive toolbox” and then a process that can be used to select tools and apply them to specific sectors or materials to achieve discrete outcomes. Recommendation #5 addresses the concept of working with industry and other stakeholders to develop specific recommendations.
6. **Generally speaking, incentives that are the most powerful and involve the least public sector cost are likely to face the most resistance from stakeholders.** We rated strategies that employ tax policy to achieve Beyond Waste outcomes very highly in terms of both effectiveness and cost-effectiveness. However, these strategies encountered strong resistance from business stakeholders who reflexively do not support increased taxes. This does not mean that all such policies are totally infeasible, but rather that they need to be carefully framed, will need a longer time horizon for successful implementation, and will have a higher risk of failure than would other approaches.
7. **Incentive policies that take advantage of and are linked to important trends, other government initiatives, and/or the programs and interests of significant stakeholder groups are most likely to be successful.** Throughout this project the consultant team endeavored to identify “horses to ride” that could lead to or be linked with Beyond Waste incentive proposals. Some of the more important “horses” we identified include:
  - Interest expressed by the Governor in new approaches to solving environmental problems and linking a vibrant economy to a healthy environment.
  - Interest by business lobby groups in finding pro-active environmental policies that they can support and by environmental groups in supporting regulatory reform proposals that maintain or improve upon existing environmental standards.
  - Support of state legislators in performance-based (rather than prescriptive) environmental policies.
  - Development of links between Washington State's economic development agenda and “clean” technologies by many different entities, including the Puget Sound Regional Council through its “Prosperity Partnership” initiative.

- Increasing momentum for action to address climate change at the state and local level and in the private sector. Market-based approaches such as carbon emission “cap and trade” policies are gaining significant traction in both the public and private sectors, and many strategies to reduce greenhouse gas emissions also reduce waste and pollution, indicating that a strong synergy may be possible.
  - Economic globalization, which is forcing businesses to be hyper-efficient in their production processes and is increasing the demand for, and price of, raw material inputs. Both of these trends provide industry with an incentive to reduce waste and improve efficiencies. On the other hand, globalization also restricts the ability of a state or nation to impose new policies such as incentives and causes the private sector to resist any proposals that might increase their costs of doing business, and therefore reduce their competitiveness, in the short term. So, globalization can be a “horse to ride” but may also be a strong counter-force to Washington State leadership on Beyond Waste and incentives.
- 8. To be successful any incentive policy will need to be well understood and generally supported by affected businesses and other stakeholders.** Accordingly, incentive policies that have clear goals and benefits and are transparent in terms of access and flows of funds (if any) are preferred. In addition, any new incentive policy will need to be well communicated to the affected businesses. To ensure accountability, incentives must include a meaningful measurement component whereby businesses receiving incentives document and report on the waste reductions achieved. Continued eligibility for incentives should be contingent on maintaining or improving upon these reductions. Note that such waste reductions should be normalized to account for changes in production levels.
- 9. Finally, incentive policies will need a “critical mass” of stakeholder support to move from concept to reality.** The stakeholder research revealed many different perspectives and opinions related to the possible incentives developed for this project. The level of support for or opposition to specific proposals varied from business to business and within different trade associations. Likewise opinions vary among environmental and government representatives. Strategic combinations of individual incentives can help create packages that appeal to a broad variety of stakeholders and help build a critical mass of support.

These strategic considerations and the consultant team’s qualitative evaluation of the high potential incentive policies provide the basis for a set of recommendations on how Ecology can best proceed with an incentive approach to achieving its Beyond Waste vision.

### 3. Incentive Recommendations

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After research into existing incentives in other areas, a review of the academic and economic literature, analysis of local conditions, and consideration of strategic factors, the consultant team makes five primary recommendations that, as a whole, are intended to help Ecology make significant progress in using incentives to stimulate environmental improvements. These recommendations are summarized below, followed by more extensive discussions.

1. **Invest in Beyond Waste innovation.** Our team recommends that Ecology start by pursuing incentive policies that support and enhance innovations and problem solving already underway in the private sector. Businesses are already investing in ways to reduce solid and hazardous waste, improve process efficiency, and increase secondary material use. This incentives package is designed to stimulate further innovation consisting of collecting and disseminating better information on material and energy flows, creation of a Beyond Waste innovations program based on industrial ecology principles, expanding the on-line system to facilitate exchange of industrial materials, and providing financial rewards or assistance.
2. **Create a “Green Track” program to reward businesses that pursue Beyond Waste practices with regulatory benefits.** We recommend that Ecology establish a “Green Track” program to provide tangible regulatory benefits to businesses that implement substantial waste and hazardous material reduction and/or secondary materials use.
3. **Reform the current hazardous waste fee system and associated policies.** The current hazardous waste fee system fails to provide businesses with a meaningful incentive to reduce hazardous substance use and engage in environmentally beneficial waste management practices. The opportunity exists to reform the system by eliminating the current Hazardous Waste Education Fee, a flat annual fee paid by all known hazardous waste generators in the state, and increasing the incentive effect of the Hazardous Waste Planning Fee, a dollar per pound fee paid by facilities generating more than 2,640 pounds of hazardous waste per year, by phasing out caps and rewarding good waste management practices. We also recommend exploration of a longer term change in the Hazardous Substance Tax. This package of incentives would likely need to be phased in over several years.
4. **Support longer term changes to material markets.** In the long term, structural changes in the way materials are bought, sold, and managed can provide significant opportunity for both environmental improvement and business flexibility. We recommend that Ecology:
  - Support ongoing efforts to establish a cap and trade systems for greenhouse gasses and explore ways of procuring greenhouse gas reduction credits by reducing waste, pollution, or use of virgin materials;
  - Create incentives for product stewardship, where industry takes significant responsibility for the full life cycle of the products they manufacture and/or sell; and

- Provide incentives for resource management contracting, where waste management service providers are financially rewarded for minimizing their clients' waste rather than maximizing disposal.

These initiatives will require significant effort by Ecology over a sustained period of time to move forward to successful implementation.

- 5. Institutionalize an incentive approach for Beyond Waste at Ecology.** The final set of recommendations relates to creating internal systems and capabilities so that Ecology can effectively develop and implement incentive policy solutions on an ongoing basis. Our research indicates that collaborating with individual industry sectors (e.g., pulp and paper, chemical manufacturing, food processing) on specific problem wastes is likely to be both well-received and particularly effective. Specific tools will no doubt be needed, but they can be developed in partnership with the industries involved. To be most effective with this initiative, Ecology would likely need to move beyond its traditional regulatory enforcement approach and undergo internal changes to focus on incentives.

# RECOMMENDATION #1: INVEST IN BEYOND WASTE INNOVATION

## INTRODUCTION & OVERVIEW

The industrial sector in Washington generates most of the hazardous wastes in the state, as well as a significant share of solid wastes. Research conducted for the Beyond Waste project indicated that Washington industry generated 186,000 tons of dangerous waste in 2000 (Cascadia and Ross, 2003). Leading sectors that contributed to this total were primary metals (mostly aluminum)<sup>3</sup>, chemicals and allied products, aerospace, petroleum refining, government institutions (including military installations), and electrical and electronic equipment. Common industrial solid wastes in Washington include paper pulp sludges, furnace ash, pot liner wastes from aluminum smelting, and oil refinery sludges. Food processing wastes such as fruit pomace, carcasses, oils, and potato scraps may also be considered industrial wastes.

To reduce the quantities of these and other wastes, many businesses in Washington, the U.S., and beyond are already taking significant action to reduce waste and the use of toxic materials. This trend has been occurring for some time and has been documented by Ecology in the Beyond Waste research and follow-up industrial focus groups, as well as in published sources such as *Zero Pollution for Industry* (Nemerow, 1995) and *Greening the Industrial Facility* (Graedel and Howard-Grenville, 2005). For example, Boeing's Commercial Airplanes Division has realized resource productivity improvements ranging from 30% to 70% using "lean manufacturing" (U.S. EPA, 2000).

Awareness of "industrial ecology" is stimulating even more action by businesses to strive for eco-efficient production, reduce waste, and consider ways to use by-products from one business as an input to production in another. For example, the pulp and paper industry has increased use of recycled fiber, found beneficial uses for its residuals, sought out alternative fuels for its boilers, and focused on reducing toxics and hazardous waste by switching (for example) to non-chlorine processes.

There are several ways for Washington to facilitate this type of industry innovation using incentives while working with industry on a voluntary basis. Underpinning this effort are the principles and practices of industrial ecology, which has proved in recent years to be an effective agent for change in business practices related to materials and energy. The study of industrial ecology involves analyzing the interactions between different industrial systems as well as between industrial systems and ecological systems. Practitioners of industrial ecology commonly focus on tracing energy and material flows through various systems with the goal of creating cyclical flows of material and energy reuse rather than linear flows that result in waste or pollution. To many, the most visible example of industrial ecology is an industrial "eco park" where industries that can use each other's byproducts co-locate for mutual efficiency and profit. Co-location, however, is not a requirement for a successful industrial ecology program.

This package, "Invest in Beyond Waste Innovation," is intended to be highly responsive to industry and to demonstrate Ecology's interest in working with the private sector to

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<sup>3</sup> Please note that since 2000 the primary aluminum industry has dramatically scaled back its Washington operations, greatly reducing its standing as a top hazardous waste generator.

achieve Beyond Waste outcomes. One key to success will be the establishment of closer working relationships and a higher level of trust between Ecology, business associations, and engaged businesses around shared interests, opportunities, and goals. It will take some time to establish this new relationship but, given the experience in other states, the consultant team believes that this type of partnership is feasible.

## **RECOMMENDED INCENTIVE POLICIES & PROGRAMS**

This package consists of four incentives designed to stimulate Beyond Waste innovation in the industrial sector.

### ***A. Collect and disseminate information on material and energy flows in Washington.***

Research has demonstrated that businesses change their behavior in response to information – either positive or negative – about waste generation and/or costs, and the availability of new material streams for production. For example, public reporting of hazardous waste generation and emissions has led businesses to reduce those emissions, as has a fuller understanding of the true costs of waste management. Knowledge about the availability of secondary material inputs has led businesses to utilize those inputs in their manufacturing.

Accordingly, Ecology can stimulate waste reduction and material reutilization in businesses by:

- Counting and widely reporting all waste flows, similar to efforts underway in Pennsylvania (Pennsylvania DEP, 2005)<sup>4</sup>;
- Providing businesses with sophisticated, user-friendly information on available secondary material flows; and
- “Mapping” the material and waste flows in a geographic region, industrial park or other relevant clustering of businesses. Such maps would show locations of byproducts generation along with other production industries that could use the waste as a material feedstock.

As this information is collected, Ecology can make it freely available and help to facilitate Beyond Waste practices by businesses. For example, Ecology could actively coordinate a materials exchange among businesses, based on its detailed understanding of material inputs and outputs in the state. Information from this mapping exercise could be combined with existing material exchanges such as IMEX to provide a comprehensive resource with some level of service offered by Ecology. See Incentive C, below, for more discussion of the IMEX program.

There are several models for this type of information-based effort to foster industrial ecology in the business sector. EPA initiated decision support models eight years ago

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<sup>4</sup> Pennsylvania tracks non-hazardous industrial waste as part of its residual waste program. A fact sheet on this program can be found at:

[http://www.dep.state.pa.us/dep/deputate/airwaste/wm/mrw/Facts/Residual\\_Waste.htm](http://www.dep.state.pa.us/dep/deputate/airwaste/wm/mrw/Facts/Residual_Waste.htm); Waste can be sorted by county or generator etc through their system as shown on this site:

[http://www.dep.state.pa.us/wm\\_apps/residualwaste02/](http://www.dep.state.pa.us/wm_apps/residualwaste02/). More information on Pennsylvania’s program can be found at: [http://www.dep.state.pa.us/dep/subject/advoun/solidwst/SWAC\\_2002.htm](http://www.dep.state.pa.us/dep/subject/advoun/solidwst/SWAC_2002.htm).

The state’s latest policy part on beneficial reuse is summarized at:

<http://www.dep.state.pa.us/dep/deputate/airwaste/wm/MRW/BeneficialUse/BeneficialUse.htm>

and they could be revitalized (Industrial Economics Inc., 1998). Other model programs include efforts in Pennsylvania, the National Industrial Symbiosis Programme in the United Kingdom (NISP, 2005), and industrial ecology activities in Denmark and Austria.

## **B. Establish a Beyond Waste Innovations program at Ecology based on industrial ecology principles and practices.**

An industrial ecology approach involves establishing close relationships with businesses in a targeted sector and then working with those businesses to identify and implement product design, process, or feedstock innovations that will achieve Beyond Waste outcomes (such as less waste, greater efficiencies, reduced toxic use, etc). The starting point is for Ecology to understand the needs and interests of the targeted business or sector (treating the business like a customer), and then determining how those interests can be aligned with Ecology's Beyond Waste goals. This may involve a change in mindset concerning the typical relationship between the public and private sectors. However the rewards are potentially significant, with many recent examples of successes based on industrial ecology approaches.<sup>5</sup>

To realize this potential, we recommend that Ecology launch an aggressive effort to facilitate and enable innovations in the private sector. Such a "Beyond Waste Innovations Program" would help industry realize cost savings and increased competitive advantage by reducing waste and toxic substance use. This program would be targeted at the largest materials processing sectors in the state (e.g. pulp and paper, concrete, chemicals, electronics, food processing) and would consist of the following steps/elements:

- Establish a ranking of targeted industries using available data on material and energy flows. The Beyond Waste Issue Paper *Moving Toward Beyond Waste in the Industrial Sector* (Ross and Cascadia, 2003) proposes some useful criteria for selecting targeted industries.
- Identify the targeted industry's "Beyond Waste potential" through collecting, mapping, and analyzing more detailed information on material flows for the specific sector in the context of a region, industrial park, or other relevant business cluster (see incentive A). "Beyond waste potential" might include shared use of by-products by different industries, substitution for hazardous material inputs, cradle-to-cradle processes, efficiency improvements, and increased use of secondary materials feedstock.<sup>6</sup>
- Convene focus group meetings with high level industry representatives to identify and/or validate potential opportunities for material reductions, reuse, and cost savings. In these meetings, develop an understanding of innovations that may already be in place, industry needs, and possible pilot projects or experiments that could be undertaken with public sector support to achieve shared public and private goals.

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<sup>5</sup> The Byproducts Beneficial Use Summit (<http://www.byproductsummit.com>) and the US Business Council for Sustainable Development's Byproduct Synergy Program (<http://www.usbcscd.org/programsandprojects.htm>) are two venues that feature leading industrial ecology success stories..

<sup>6</sup> This opportunity assessment research and the subsequent industry focus groups could also include an identification of specific regulatory changes that would enable increase secondary material use and flows in the targeted industries. Thus there is an overlap with the "Green Track" package outlined elsewhere in this report and natural synergies between fostering innovation and providing the regulatory flexibility to implement those innovations in order to achieve better environmental outcomes.

- Based on the results of these research phases, develop and implement an innovations program for the targeted industry, working closely with industry trade associations throughout the process. The role for the government sector in this implementation phase could range from providing technical expertise or research and development support at state universities to facilitating regulatory approval for a pilot study or experimental process. Tax credit and regulatory responsiveness incentives, as described in the Green Track section of this report, could be used as additional incentives.
- Track the outcomes of the activities at the business and industry level. Distribute that information widely to industry members via the internet and through trade associations. Be sensitive to confidentiality concerns by setting, communicating, and observing clear standards about what information will and won't be shared.

We recommend that this program be pursued in close coordination with relevant trade associations to avoid the cynicism associated with the line: "the government is here to help."

### ***C. Improve and expand Washington's materials exchange program***

A separate but related recommendation is for Ecology to improve and expand the existing regional industrial materials exchange program. The Industrial Materials Exchange, or IMEX, is a regional (Washington, Oregon, and Idaho) listing service sponsored by King County Local Hazardous Waste Management Program (LHWMP) where companies can buy and sell raw materials, surplus, or byproducts. The list is published online<sup>7</sup> and includes listing for chemicals, equipment, metals, sludges, building materials, oils, paints and coatings, plastics and rubber, textiles, wood, and paper. In 2004, IMEX had a total of 445 new listings and 133 reported exchanges. The exchanges included 25 tons of materials that would otherwise have been hazardous waste and nearly 100 tons of material that would have become solid waste (LHWMP, 2005).

Over the next two years, LHWMP will be re-evaluating the IMEX exchange and exploring opportunities to improve and expand the exchange. LHWMP is interested in taking IMEX in new directions and forming partnerships with other local and state agencies, particularly Ecology (Jeff Ketchel, IMEX Coordinator, Personal Communication, June 21, 2005).

The Department of Ecology could collaborate with LHWMP with the goal of strengthening and expanding the exchange. Possible alternative approaches include:

- Promoting the Exchange to businesses in targeted sectors through various means including advertising, internet marketing, and referrals by Ecology inspectors and other staff. Share results of the materials mapping exercise described above.
- Transitioning IMEX from a service solely operated and managed by LHWMP to one with significant private sector or state involvement. One option would be for Ecology to work with LHWMP to transition IMEX from a local government service to a state-supported service, perhaps working in partnership with government agencies in Oregon and Idaho. Another option would be to transition IMEX from a free government service to a commission-based private sector service, perhaps working through an existing business such as E-Bay to increase visibility,

<sup>7</sup> The print version of the IMEX catalog was discontinued in June, 2005.

technological capacity, and program use. Either option would help expand IMEX's scope and visibility while offering support to LHWMP, IMEX's current host and funder.

- Having Ecology staff actively facilitate deals between buyers and sellers.

It should be noted that Ecology already takes an active role in promoting other material exchanges. For example, Ecology hosts the 2good2toss website which involves 14 participating counties providing users with the opportunity to exchange used building supplies and large household items.

#### ***D. Fund R&D for Beyond Waste innovation***

As businesses move forward with efforts to achieve the Beyond Waste vision, they will inevitably encounter technological and economic barriers associated with the reuse of byproducts, decreased virgin material use, and process efficiency improvements, among others. While government efforts are somewhat restricted because of the lending of credit clause in the state constitution, the public sector can still play an important role in using financial incentives to stimulate technological innovation around material use. Recommended actions include:

- **Provide grants to State universities or other publicly funded entities for R&D projects conducted in partnership with private companies.** One possible partner is the Washington Technology Center which currently sponsors the Northwest Energy Technology Collaborative (NWETC). The NWETC promotes Washington as a location where new energy technology companies must establish a presence to be truly competitive in the world market. It also helps local communities conduct pilot studies and initiate early adoption of new energy technologies. This effort is primarily funded by the energy sector in the Northwest. A similar effort could be established related to materials efficiency and reuse, (which, in fact, have a strong relationship with energy, creating the possibilities for synergies). Another possibility would be for Ecology to work with the UW Design for Environment Lab.
- **Offer "golden carrot" awards.** "Golden carrots" are cash prizes paid to companies that bring to market a particularly desirable new technology. Golden carrots are credited with bringing about large advances in navigation, airplanes, automobiles, chemicals, electronics, and home appliances. For environmental improvements, the most notable example of a "golden carrot" was the U.S. Federal Government's "golden carrot" for refrigerator energy efficiency.<sup>8</sup> Rather than a direct cash prize, some golden carrot awards are paid out as market subsidies on the first x number of products sold by time y. The Rocky Mountain Institute has recently compiled lessons learned from golden carrots (and platinum carrots!) in its Oil End Game report (Lovins et al., 2004). Golden carrot awards could be effective at stimulating Beyond Waste innovations in the private sector. To get the most "bang for the buck" we recommend that Ecology focus this program on a specific material stream or desired type of innovation. The specific golden carrots to be awarded would need to be developed based on significant

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<sup>8</sup> See: "Super Efficient Refrigerator Program, Profile #106," Bonneville Power Administration website: [www.bpa.gov/Energy/N/Reports/Results\\_Center/pdf/106/pdf](http://www.bpa.gov/Energy/N/Reports/Results_Center/pdf/106/pdf), accessed June 21, 2005; and "U.S. Energy-Efficient Technology Procurement Projects: Evaluation and Lessons Learned, M.R. Ledbetter et al, February 1999, Pacific Northwest National Laboratory.

research into specific technological hurdles in industry. Also, we recommend that Ecology seek to leverage its investment in this award program with funds from other private, non-profit, or government entities.

- **Facilitate low interest loans to fund new infrastructure or process improvements.** Stakeholders have indicated that access to capital can be a barrier and suggested low-interest loan opportunities. Due to limitations in the State Constitution, Washington cannot itself fund or offer such loans directly to private entities, but other organizations may be able to partner or assist. In particular, the Cascadia Revolving Fund is an organization dedicated to offering loans to underserved communities. The Fund formerly had an environmental focus, but they found that they received few applications (Kathleen Burton, Cascadia Revolving Fund, personal communication May 24, 2005). There may be an opportunity to work with the Fund to revive this line of their business, but a funding source other than State funds would be needed. Another possibility is Shore Trust and Shorebank Pacific, which offer business development loans to small businesses that pursue innovative and sustainable practices, particularly in rural Washington (Shore Bank, 2005).

## HOW WOULD IT WORK/IMPLEMENTATION

The incentive policies and programs outlined above could, for the most part, be implemented within existing Ecology programs and regulatory authority. However, additional funding will likely be required to effectively implement several of these recommendations (especially D – funding innovation), and legislation might be required to authorize the collection and dissemination of additional information from the business sector about their material and waste flows. Possible sources of funding include a solid waste surcharge and/or funds generated through potential reform of the hazardous waste fees or hazardous substance tax.

In pursuing these initiatives, we recommend that Ecology reach out to both trade associations and environmental/health interests to include them in the next phases of the policy design. Close working relationships with industry trade associations will be critical to successful implementation. However, support from environmental and health stakeholders will also be important for Ecology's "license to innovate" with the preeminent goal of delivering better environmental outcomes.

We also recommend that Ecology work in partnership with and through existing agencies and organizations to implement these initiatives. Possible partners include the Washington Technology Center, the Northwest Bio-products Research Institute, UW, WSU, and Western Washington University, the Puget Sound Regional Council's Prosperity Partnership, and CTED. Also, to the extent that there are links with achieving energy efficiencies, pursuing joint actions with such entities as the Northwest Energy Efficiency Alliance and the Bonneville Environmental Foundation could be beneficial.

Parts of this package can potentially be funded within Ecology's existing Beyond Waste budget by redirecting funds. However, any significant level of financial incentives will require a funding source, such as a surcharge on solid waste or adjustments to the hazardous waste planning fee. Industry will likely resist any such increase. To mitigate this potential opposition it is recommended that this program be structured so that most of the funds received are returned to the private sector through grants, tax credits, and loans etc.

This incentives package can be shaped to appeal to both large and small businesses and multiple business sectors. However, it is likely to be most appealing to larger businesses with large-volume waste streams. Careful shaping of the scope and focus of the package will be essential to gaining business stakeholder support going forward.<sup>9</sup>

## **JUSTIFICATION AND ASSESSMENT**

This incentive package – investing in business and technological innovation – is recommended for several reasons:

- A generally positive response from business stakeholders regarding efforts to promote and assist their innovation efforts. Some stakeholders, however, expressed skepticism that Ecology would be effective at fostering or identifying opportunities for private-sector innovation.
- The inherent popular appeal of having Ecology pursue an innovations agenda and attempting to work with the business community on design and implementation;
- The relatively high technical feasibility of implementation, given the successful track record of industrial ecology-type initiatives elsewhere in the country;
- The strong potential to achieve positive results for the environment in a cost-effective manner; and
- The existence of several “horses to ride” that can serve to increase the potential for success, including the Puget Sound Prosperity Partnership’s current focus on promoting clean technologies as an engine for regional economic growth (Puget Sound Prosperity Partnership, 2005),<sup>10</sup> the intense focus of businesses on innovation as a means to achieve competitive advantage, the Association of Washington Business’ (AWB) stated interest in working on proactive environmental policies, and growing social pressures on companies from the public and third parties to reduce wastes and toxics.

The challenges associated with this incentive package include:

- The potential difficulties of establishing a supporting culture and framework within Ecology for innovation and facilitation of business partnerships, when the traditional model is one that focuses on regulation and compliance;
- A lukewarm response from some environmental and local government stakeholders, who are skeptical that a focus on innovation will provide enough of an incentive, while others think these proposals are good ideas;

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<sup>9</sup> The stakeholder research revealed some of the issues that will need to be addressed to move this package forward. Some businesses are distrustful that government can effectively foster innovation and so are not supportive of using taxpayer funds for activities such as R&D grants. In addition, many businesses may be reluctant to share information – either on material flows or on the innovations that they are already pursuing. Also, some businesses are concerned about potential future liability associated with recycling industrial wastes, so even if they are interested in innovation they may be reluctant to participate. Finally, it will take time for some businesses that are used to an adversarial relationship to consider government as a trusted source of assistance with their materials and associate business practices. These issues point to the need to work with and through trade associations, universities, or other trusted “third party” entity on materials innovation.

<sup>10</sup> The Puget Sound Regional Council’s Prosperity Partnership plan is “A Regional Economic Strategy for the Central Puget Sound Region. This document includes a section on the proposed Clean Technology cluster strategy. Recommendations include creating an Institute for Innovation and Sustainable Development and creating a Center for Coatings and Materials in Energy Systems.

- Potential resistance from industry over collecting and sharing information about waste and material flows; and
- The difficulties of obtaining sufficient resources for implementation.

Overall, however, the consultant team strongly recommends that Ecology pursue the Beyond Waste innovations package, with implementation of at least the first two initiatives (information and the innovations program) and strong consideration of pursuing the IMEX program and funding for innovation as well. We believe this package has a high potential for acceptance in the near term and success in the medium term and thus represents a strong starting point for the next phase of Beyond Waste plan implementation.

## **RECOMMENDATION #2: CREATE A “GREEN TRACK” PROGRAM TO REWARD BUSINESSES THAT PURSUE BEYOND WASTE PRACTICES**

### **INTRODUCTION & OVERVIEW**

The Green Track initiative aims to reward businesses for superior environmental performance that results in significant solid and/or hazardous waste reduction or increased use of secondary materials. The proposed Green Track is informed by lessons from previous attempts in Washington and other states to promote “beyond compliance” performance through regulatory flexibility and recognition. Specifically, we are aware of the Washington Environmental Excellence Law (1997), environmental leadership activities in King County and others, as well as the recent Memorandum of Agreement between Ecology and U.S. EPA regarding the Performance Track program. Green Track is intended to build on and compliment these efforts by addressing key factors that have limited their success and/or by reaching a broader array of businesses through more robust incentives.

In addition to learning from past efforts and complimenting current initiatives, the Green Track program is based on the following key outcomes from the research conducted in this project and past Beyond Waste efforts:

1. A preference for voluntary approaches that partner with the business community to achieve waste reduction in ways that are flexible and not overly burdensome;
2. A recognition of the need for both targeted sector-specific efforts as well as broader cross-cutting ones; and
3. An understanding that the incentives need to be significant and the program needs to be simple for companies to participate, yet it must include elements to measure performance and ensure accountability.

Research conducted for this project identified both the challenges and opportunities associated with attempting to provide regulatory relief to businesses as an incentive for superior environmental performance. Several constraints limit the potential for this type of incentive, including the need to comply with federal laws and regulations, skepticism from the environmental community, and the complexity associated with finding solutions that indeed provide both regulatory relief and improved environmental performance.

Nonetheless, there is some interest from stakeholders in these types of incentives, which offer the potential for significant environmental and economic benefits at relatively low cost. Perhaps the greatest potential is associated with the opportunity to change the relationship between Ecology and the business community from one based solely on compliance and enforcement to one where Ecology includes a stronger emphasis on encouraging and rewarding superior environmental performance. Accordingly, this initiative has a strong synergy with Recommendations #1 and #5 regarding investing in Beyond Waste innovation and institutionalizing an incentive approach at Ecology.

## RECOMMENDED INCENTIVE POLICIES & PROGRAMS

This package consists of four initiatives designed to reward businesses for positive environmental performance.

### ***A. Provide increased recognition for small businesses doing the right thing***

Companies that significantly reduce their solid and/or hazardous waste generation or utilize large quantities of secondary materials deserve to be recognized as environmental leaders who contribute to Ecology's Beyond Waste vision. There are numerous ways companies can be recognized, such as awards, certification programs, and marketing.

We recommend that Washington expand the EnviroStars program, a recognition program already successfully implemented in selected Washington counties. It was initiated in 1995 in King County and has since expanded to Jefferson, Kitsap, Pierce and Whatcom counties. Certified EnviroStars businesses are given a two-to-five star rating based on their commitment to pollution prevention and reducing hazardous waste. The higher the star rating, the more proactive the business has been in protecting the environment. The EnviroStars logo and the online business directory allow consumers to identify environmentally sound businesses.<sup>11</sup> Businesses that wish to enroll in the EnviroStars program first complete an application form and checklist to report their current hazardous waste management practices. There are both general and sector-specific checklists (current target sectors are auto repair, autobody, dental, dry cleaning, landscaping and marina). EnviroStars then conducts a site visit to verify that waste is properly managed.

The EnviroStars program could be expanded as part of the Green Track initiative to achieve Washington's Beyond Waste goals in the following ways:

- **Expand the scope** (currently focused primarily on hazardous waste) to include a greater emphasis on solid waste and secondary materials use. For example, the food processing and restaurant sectors could be targeted with the aim of diverting the large stream of organics to composting and reuse.
- Tie the various levels to **regulatory responsiveness** (see incentive B). For example, achieving four stars could be rewarded with reduced inspections and five stars rewarded with permitting flexibility. One of the requirements to achieve a five-star rating for manufacturers could be adoption of an approved labeling approach (e.g., Green Seal) that clearly identifies all product constituents, including hazardous materials.
- Make the program **state-wide**. Build on the success achieved in western Washington by expanding the program state-wide. In expanding the program geographically, Ecology needs to build in flexibility so that the program can be adapted for rural areas. Ecology will have to determine the best way to pursue a state-wide EnviroStars program and to do so without undermining existing efforts. Other counties have expressed interest in the program in the past, but resource

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<sup>11</sup> Though the EnviroStars logo is not considered an endorsement of particular products or services, it can be used in brochures, advertisements, fact sheets, letterhead, business cards, newsletters, websites and other promotional materials (<http://www.envirostars.com/certification/logo/index.html>). This is one form of labeling as an incentive for industry since it communicates positive information to consumers and enhances business reputation.

constraints have limited their participation. This raises the issue of whether an expanded EnviroStars program should be administered by Ecology, by the counties, or by some combination of the two. In order to build on the strengths of the existing program, we suggest Ecology explore a hybrid program whereby Ecology provides the services to the remaining counties around the state, and supports the continuation of the five counties that currently have programs. The state-wide program could be something akin to a delegated program in which counties that develop and administer their own programs, consistent with Ecology guidelines, would receive financial support from the Department, while other counties would rely directly on Ecology for the program.

- **Streamline verification.** The current program is resource-intensive, since it requires a site visit to each business upon enrollment and for re-enrollment. Adopting a statistical framework such as that used in the Environmental Results Program (ERP; see incentive B) would reduce the need for site inspections and lower overall oversight costs incurred by Ecology and the counties. Through ERP, businesses self-certify, and their results are compared to a statistically significant sample that is inspected. Other mechanisms, such as “red flag” questions, can help determine if businesses are self-certifying honestly.
- Consider additional sector-specific requirements for recognition such as for photo-processors, printers, food processors and restaurants.

In addition to EnviroStars, Ecology can recognize good performers in a number of small ways, including publishing business success stories and best practices in Ecology’s newsletter and other publications. Going beyond the formal recognition programs will help build the broader partnership between Ecology and the business community in promoting adoption of a Beyond Waste approach. Note that the value of recognition programs is often significantly enhanced when they are linked to other efforts such as those described below under regulatory responsiveness.

### ***B. Increase regulatory responsiveness efforts; implement an Environmental Results Program for small business***

In 1997, Washington passed an “Environmental Excellence Law” that authorized agreements between state agencies and regulated bodies to use innovative environmental measures or strategies to achieve environmental results more effectively or efficiently than existing requirements. The program has not met with much success, as only one party has submitted a proposal for an agreement since 1997. However, in 2004 Washington signed a Memorandum of Agreement with U.S. EPA’s Performance Track in order to encourage businesses in the state to participate in the program, which includes recognition and other incentives, including regulatory flexibility for businesses with strong environmental performance.

To date, the success of the Performance Track program in Washington has been limited due to a number of factors, including: (1) some businesses are not eligible because of past compliance problems; (2) the incentives are few (increased RCRA holding time, reduced MACT reporting, possibly fewer inspections if an Environmental Management System (EMS) is in place; and recognition) and do not apply or appeal to many companies; and/or (3) companies do not know about the program. Moreover, it appears that some companies may view Performance Track as simply another bureaucratic initiative from the federal government.

Experience with past programs as well as input from stakeholders have revealed that companies are keenly interested in regulatory flexibility/responsiveness in terms of less reporting and monitoring and streamlined permitting, and that these benefits need to be clear and real in order to attract business participants. We suggest that Washington expand its regulatory responsiveness program to compliment Performance Track and encourage additional participation. Thus, we are proposing additional regulatory responsiveness incentives offered through the Green Track program, which are aimed at a broader array of businesses and could offer incentives beyond those under Performance Track.

Many states (e.g., Texas, North Carolina) offer a range of regulatory responsiveness incentives depending on the business' level of commitment. Possible incentives include reduced fees for permits, streamlined reporting, reduced inspections, and exemption from planning requirements. Others (e.g., Virginia) are more narrowly focused with a single or very limited set of incentives for a particular environmental commitment or improvement.

Washington should consider increasing regulatory responsiveness by integrating a set of tiered regulatory flexibility incentives into the EnviroStars program and/or by implementing an Environmental Results Program with such incentives for targeted sectors

#### **ENVIRONMENTAL- RESULTS PROGRAM**

Washington State could promote waste reduction and better environmental performance in small businesses by creating a self-certification program modeled after the Environmental Results Programs (ERPs) in other states.

ERP was first established in Massachusetts with the goal of regulating a large number of small, traditionally hard to regulate facilities in key sectors (e.g., photo processing, dry cleaning, printing) with an efficient use of state resources. While individual businesses in these sectors and their waste streams tend to be small, because the number of businesses in each sector is large, their aggregate waste generation, particularly for certain hazardous wastes, is significant. ERP features a multimedia, sector-based regulatory approach that replaces facility-specific state permits or other traditional regulatory approaches with industry-wide environmental performance standards and annual certifications of compliance. ERP applies three innovative tools to enhance and measure environmental performance. These tools supplement traditional compliance inspection and technical assistance efforts:

1. An annual **self-certification by companies**, which will serve to increase self evaluation and accountability;
2. Technical assistance from the agency (and possibly third party organizations) through outreach and innovative workbooks; and
3. A statistically-based performance measurement methodology to track results, determine priorities, and strategically target inspections and technical assistance efforts.

Through ERP, facilities are educated about their environmental impacts and obligations, and as part of the education and self-certification process, are encouraged to go "beyond compliance."

Initial results in Massachusetts show that releases of hazardous waste into the environment have been reduced significantly among ERP sectors. For example, printers were found to have reduced VOC emissions, ceased disposing of hazardous waste with their solid waste, and eliminated practices such as washing ink-contaminated press rollers in sinks. Dry cleaners were found to have made significant compliance and pollution prevention changes to their operations as a result of ERP. Changes included: instituting leak detection and repair programs; changing filters more regularly; vacuuming coils on a regular basis; scheduling full loads whenever possible; and eliminating illegal wastewater discharges. Finally, photoprocessors found that ERP prompted reductions in silver discharges to wastewater treatment facilities through installation of silver recovery units and frequent planned cartridge changes.

### **Examples from Other Areas**

- Massachusetts has established ERPs for dry cleaners, photoprocessors, printers, boilers and holding tanks.
- Florida, Maryland, the District of Columbia and Rhode Island have developed programs for various aspects of their auto repair/auto body industries.
- Tennessee adopted an ERP for underground storage tanks (USTs) and is working with EPA to develop the program.

### **How ERP Would Work in Washington**

There are a substantial number of small business sectors in Washington that generate significant hazardous waste streams (e.g., vehicle repair, printing, dentists and other medical, machine shops, other manufacturing, and painting). ERP could be adapted for Washington, as it has been for other states, in two or three small business sectors (e.g., restaurants, grocers) with potential for significant waste reduction and environmental improvement.

Alternatively, WA could explore applying ERP across sectors with a focus on waste streams, possibly in conjunction with recognition through an expanded EnviroStars program (see incentive A). Such a program could have several elements. First, it could be expanded to focus on solid as well as hazardous waste streams. Businesses that generate quantities of hazardous waste over certain thresholds are already required to track and report such wastes. Under a cross-sector ERP program, this could be expanded to solid waste streams, whereby businesses large and small would report on waste volume generated and diversion rates.

Second, businesses would be rewarded for participation and environmental performance, and incentives could vary according to performance levels. Possible incentives for participation include recognition, a single point of contact at Ecology for regulatory and non-regulatory assistance, etc. Incentives for high performance could include reduced inspections (or increased inspections for businesses that do not self-certify), or preference in government procurement policies. Third, some external monitoring would be required, particularly if the higher level incentives involve less reporting or oversight. Hazardous waste generation and management could be verified through the official manifests submitted when waste is collected, except for small quantity generators (SQGs) who are not required to report. Solid waste quantities could be verified if Resource Management contracting were in place (see incentive B under Recommendation #4) whereby baseline waste generation is carefully documented by

the participants and used as a basis of comparison to track the impact of the new contracting approach and/or other incentives.

ERP is a flexible model that could be adapted for Washington and the Beyond Waste goals. EPA's Office of Policy Economics and Innovation (OPEI) has been supporting the adoption of ERP as a flagship program through technical assistance and innovation grants to states. Especially if Washington were to adopt an innovative approach, expanding ERP beyond a regulatory compliance and hazardous waste focus, it may be a good candidate for support from OPEI.

### ***C. Offer B&O tax credit for increased use of recycled materials in production process***

The Federal Government offers corporate income tax deductions for firms that exploit natural resources, such as petroleum (the Petroleum Depletion Allowance), minerals (the Mineral Depletion Allowance), and timber (Timber Depletion Allowance). Although removing these depletion allowances from the Federal Tax Code is beyond Washington's capability, state tax incentives could be offered to help level the playing field for companies that use recycled feedstocks rather than virgin resources. The state could therefore offer a "Resource Conservation Credit" on the state B&O tax to "Beyond Waste" manufacturers that utilize secondary materials in their manufacturing process. There are numerous precedents for this, as Washington offers numerous B&O Tax incentives to business to encourage local economic development or other preferred behaviors.

Resource Conservation Credits could be awarded to manufacturers that utilize secondary materials in their manufacturing process. In order to qualify at a minimum, a manufacturer must:

- Operate a manufacturing facility within the state of Washington;
- Utilize secondary materials in the manufacturing process within the facility or facilities owned by the manufacturer within the state of Washington;
- Significantly increase and document the use of secondary material in its feedstock;
- Have an up to date and approved Pollution Prevention Plan as required by Chapter 70.75C RCW.

Additional Resource Conservation Credits could be secured by:

- Sourcing needed secondary materials from within the state of Washington;
- Phasing out or eliminating hazardous substances in the manufacturing process; or
- Utilizing secondary materials in new products that are equal to or greater in value to the products from which the material was originally manufactured.

Resource Conservation Credits could also be offered for the purchase of equipment for recycling; a similar credit is currently embedded in the recently passed federal senate energy bill.

Further incentive development will be needed to ensure that the Resource Conservation Credit would sufficiently encourage new and increased use of recycled materials rather than simply rewarding existing behavior.

## **D. Strengthen P2 Plan Implementation**

Ecology has a well-developed program requiring all medium and large generators to develop Pollution Prevention (P2) Plans<sup>12</sup>. Each qualifying business must complete a comprehensive report on their past, current, and planned future practices. They must set five-year goals for pollution prevention and hazardous waste reduction, and report annually on progress toward these goals and adjust them if necessary. This existing framework presents an opportunity for Ecology to further its Beyond Waste goals in the following ways.

Solid waste reduction and use of secondary materials could be emphasized in the planning framework. Currently, businesses' P2 Plans must include reduction goals for hazardous waste, but solid waste reduction goals are optional. Ecology could require a solid waste plan similar to that required for hazardous waste, or provide another type of incentive for reporting. Since sector-specific hazardous waste technical assistance information is already readily available for businesses in creating their plans, similar sector-specific information could be provided for solid waste, including options for source reduction, composting, and reuse.

Lack of implementation has been cited as a problem with current P2 plan requirements. Additional incentives may be required to promote implementation of key elements of P2 plans and documentation of actual waste reductions. As mentioned above, a B&O tax credit could be offered to businesses that take significant implementation steps and demonstrate reductions in hazardous and solid waste generation and disposal. Reductions that qualify for the credit could be incremental (i.e. 5 to 10% a year), or benchmarked against the companies' P2 Plans and/or statewide Beyond Waste goals (i.e. recycling x% of solid waste).

### **HOW WOULD IT WORK/IMPLEMENTATION**

Some of the incentives described above could be implemented within existing Ecology programs and regulatory authority. However, the B&O tax credit would require legislative approval, and implementation of ERP may require legislative/regulatory authorization. Additional funding or shifts in current funding will likely be required to effectively implement several of these recommendations, especially expanding EnviroStars state-wide and establishing an ERP. Possible sources of funding include an increase in the solid waste tip fee.

The initiatives presented above complement each other and so can fit together as a "Green Track" package that could be pursued by Ecology. However, certain of these initiatives could be fully integrated (recognition and ERP), while others could stand on their own (B&O tax credit). Experience has shown that recognition programs are most effective when combined with other incentives.

In pursuing these initiatives, we recommend that Ecology reach out to both business groups and environmental/health interests to include them in the next phases of the policy design. As with the innovations package described above, development of the regulatory responsiveness incentives package needs to be done in conjunction with other stakeholders, particularly with the business and environmental communities.

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<sup>12</sup> See <http://www.ecy.wa.gov/programs/hwtr/p2/p3.html>.

## JUSTIFICATION AND ASSESSMENT

The Green Track incentive package is recommended for several reasons:

- A strong interest in regulatory responsiveness approaches from business stakeholders, although there was some skepticism about certain elements (e.g., recognition, especially if not coupled with other elements);
- Green Track can be positioned as being responsive to the issues and concerns of the WA State Competitiveness Council, providing political benefits (although some opposition from environmental interests could also be encountered);
- The relatively high technical feasibility and fairness of implementation, given the track record of ERPs success elsewhere in the country and that the approach reflects the “polluter pays” principle; and
- The existence of several “horses to ride,” including the AWB’s interest in working on proactive environmental policies, which can serve to increase the potential for success.

The challenges associated with this incentive package include:

- A skepticism on the part of some environmental and local government stakeholders, who are concerned with measurement and documentation to ensure regulatory responsiveness results in actual waste reductions and other environmental improvements;
- Potential resistance from industry over collecting and sharing additional information about solid waste generation and management;
- The difficulties of obtaining sufficient resources for implementation;
- The complexity of the existing regulatory system and the perception among the business community that the federal system is overly rigid and inhibits state-level innovation; and
- The difficulty in creating a system that is not overly costly to either Ecology or the business community.

Overall, the consultant team strongly recommends that Ecology consider the Green Track incentives package. We believe this package has the high potential for reaching larger businesses with the B&O tax credit and P2 planning improvements and smaller businesses with an expanded EnviroStars program and new Environmental Results Program.

## RECOMMENDATION #3: PURSUE HAZARDOUS WASTE TAX AND POLICY REFORM

### INTRODUCTION & OVERVIEW

Washington currently has two hazardous waste fees and one tax on hazardous substances. The Hazardous Waste Education Fee is a flat fee assessed annually on certain businesses that generate hazardous wastes. In 2005 the fee is \$46 per firm. The Hazardous Waste Planning Fee is a per-pound fee assessed on all facilities that generate more than 2,640 pounds of hazardous waste each year or that report toxic releases as part of the Toxics Release Inventory (TRI) requirement. The total fee payment is capped for individual facilities at a little over \$13,000 per year. In addition, there is an overall cap on total revenue collected from the fee. The Hazardous Substance Tax is a 0.7% tax on the wholesale value of hazardous substances used in the state.

Although these fees and taxes provide a useful source of revenue to fund particular environmental programs at the state and local level, the incentive effects of the instruments – i.e., the extent to which they lead to environmentally beneficial changes in behavior – could be vastly improved. The package of reforms that we outline in this section meets the dual objectives of increasing incentives for industry but still working within an existing system of fees and taxes. Environmental charges can be very difficult to put in place because the direct financial impact they impose – the very thing that works to change behavior – is strongly resisted by the affected firms. Because of these stakeholder impacts and because an important criteria for us is political viability, we attempted to stay within the existing legislative framework. Although we are suggesting serious changes here, including amending current legislation, one virtue of the package is that no *new* legislation would be required.

- 1. Eliminate the Hazardous Waste Education Fee.** The Hazardous Waste Education Fee provides no incentives for industry to make changes to reduce hazardous wastes. It is a pure revenue-raising instrument. The small amount of revenue that it earns for the state -- \$750,000 in 2002 – could be easily made up by the new Hazardous Waste Planning Fee that we suggest below. Moreover, eliminating the fee could reduce administrative costs for the state and for the affected firms.
- 2. Phase out the Caps on the Hazardous Waste Planning Fee.** Unlike the Education Fee, the Planning Fee is assessed per pound of hazardous waste generated. Therefore, in theory, the more pounds of waste generated by a facility, the higher the fees that facility will pay. This should spur the facility to strive to reduce the pounds generated so as to reduce its fee payment. Unfortunately, because the state caps the amount that any individual facility must pay, this effect does not strictly hold. The reality is that a small number of facilities produce the vast majority of the hazardous wastes generated in the state each year. In 2002, 98% of all hazardous wastes subject to the Planning Fee were generated by the 10% of the facilities that had their fee payments capped. The remaining 90% of the facilities generated only 2% of the wastes.

Not only is there an inequity in the way that the fee system is set up – the 10% of facilities generating 90% of the wastes paid \$1.95/ton in 2002 while the uncapped

firms paid nearly \$75/ton – there is a serious lack of incentives facing the high-polluting firms. Once they know that their waste volumes for the year have reached a high enough level that their fee payments are capped, they have no incentive to try and reduce wastes since they reap no financial reward for doing so. The only incentive would be to try and get below the cap but for many of these large polluters, it may be very difficult to do so.

One approach for change would be to keep the cap on total program revenues and set a per-pound fee that all firms would pay. In 2002, the revenue cap was \$1,361,745; charging all firms a fee to meet that revenue requirement would have implied a per-ton fee of \$3.51. If this fee had been charged to all facilities, those facilities that were capped in 2002 would have experienced 80% higher fee payments while uncapped facilities would have had 95% lower levels of payments. These are big changes in fee costs for the firms. We advocate that these changes be phased in. Also, to partially offset these impacts and more importantly, to do a better job of providing incentives for proper behavior with respect to hazardous wastes, we propose that the fees be restructured to reward environmentally friendly end-of-life management. We outline these changes in the next section.

- 3. Change the Hazardous Waste Planning Fee Structure to Reward Good Waste Management Practices.** Although a per-pound fee assessed on all hazardous wastes generated provides an incentive for firms to reduce their generation of such wastes, it does not differentiate between wastes that are landfilled, those that are incinerated, those that are treated, and those that are illegally disposed. Clearly, the environmental costs imposed on society vary depending on the waste management method chosen. Thus, one would like a fee structure that would reward more benign end-of-life management systems and penalize those that are less benign.

Several states have such systems in place, including Minnesota, New York, Oklahoma, Oregon, and Pennsylvania. In Oregon, the state charges a base fee of \$110/ton of hazardous waste generated and uses a fee factor that ranges from 0 to 2.0 depending on the management method chosen. Incineration and various kinds of inorganic treatment have a fee factor of 1.0, thus the fee is \$110/ton for wastes subjected to these forms of management. Land disposal has a fee factor of 1.50, thus landfilled hazardous wastes face higher fees. Management methods with fee factors below 1.0 include: fuel blending and energy recovery, with a factor of 0.75, and solvents recovery and metals recovery for reuse which have a factor of 0.50. For wastes where the management method is “unknown or not reported,” the highest fee factor of 2.0 applies. The other states with a differential fee scale also set their lowest fees for recycling and treatment, with slightly higher fees for incineration, and higher still for land disposal. We suggest that the Hazardous Waste Planning Fee be altered in a similar fashion.

These systems appear to work fairly well. State environmental officials in Oregon, where such a system has been in place for at least a dozen years, report no problems with compliance and relatively low administrative costs. Interestingly, Oregon’s electronic hazardous waste reporting system was developed by the same contractor that developed Washington’s system, and is thus virtually the same as

Washington's.<sup>13</sup> This suggests that a change to a management-based fee would not be too difficult. This change would have the benefit of improving incentives for mitigating the environmental impacts of hazardous wastes while also providing a way to reduce the burden imposed on those facilities whose fees are increased when the caps are removed.

- 4. Change the Hazardous Substance Tax from a Percentage of Value Basis to a Per-Pound Basis.** While the hazardous waste fees are very useful for targeting an important environmental problem – hazardous wastes generated during industrial production processes – they do not target a variety of other hazardous materials present in the environment. Many products contain hazardous substances and these substances eventually may be released into the environment through product use and/or at end-of-product-life. At the moment, the only way that these hazardous substances are targeted by any fee or tax in Washington is through the Hazardous Substance Tax, which is assessed on the first possession of the substance in the state. Thus, the tax can potentially serve a useful function and provide important incentives for producers to decrease their use of these substances and find alternatives. However, the tax is currently a percentage of the substance value. Thus a substance that has very low dollar value but imposes a significant harm to the environment pays a low tax relative to something with a high value that does less damage. Changing the tax to a per-pound tax rather than an ad valorem tax would improve its environmental incentive properties.

Even setting the tax on a per-pound basis is not perfect however, since a pound of one substance may be much more damaging than a pound of a different substance. Ideally, the tax would vary in some way with the degree of toxicity and/or the risk of significant harm to the environment. The U.S. EPA has developed the Risk Screening Environmental Indicators Tool and this is one method that could be employed. We suggest that Ecology, working together with the Department of Revenue, research the possibilities for eventually altering the structure of the Hazardous Substance Tax in this way. In the short run, changing the tax to a pound basis rather than value basis would significantly improvement the incentive properties.

- 5. Remove the Discrepancy in Hazardous Substance Tax Paid by Petroleum and Non-Petroleum Products.** Petroleum products currently account for approximately 85% of all revenues raised by the Hazardous Substance Tax. Although petroleum products undoubtedly cause harm to the environment, the incentives provided by the Hazardous Substance Tax should probably be focused on other hazardous substances. Petroleum products, and the environmental risks posed by various activities related to the transport and use of those products, are already covered by other taxes and policies. Washington has a petroleum products tax equal to 0.5% of the wholesale value of the good; an oil spill tax assessed at 5 cents per barrel on all oil shipped into the state; a retail gasoline and diesel tax of 28 cents per gallon; and financial assurance and liability programs that cover problems associated with underground storage tanks and home heating oil tanks.

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<sup>13</sup> Information gathered from personal communication with Nancy Dollar, Oregon Department of Environmental Quality, June 24, 2005. Oregon does have caps on the annual amounts that facilities must pay but the caps, at \$27,500 are more than twice as high as Washington's caps. Nancy Dollar reports that approximately 90% of facilities in Oregon are below the cap. (She did not supply us with a similar figure in terms of *tons* generated, rather than number of facilities.)

We recommend that Ecology and the Department of Revenue, when evaluating the possibility of having a tax that varies with product risk, also study the possibility of transitioning petroleum out of the hazardous substances tax (with corresponding increases to the petroleum products tax to maintain the same overall tax rate) to more clearly focus the Hazardous Substance Tax on highly hazardous substances. Please note that in the short run we are not recommending this change. Rather, we suggest that it would be good for this issue to receive further research and analysis.

## **HOW WOULD IT WORK/IMPLEMENTATION**

Changes to the two hazardous waste fees and Hazardous Substance Tax would require changes to the legislation underlying these policy instruments. The hazardous waste fees are established in state law RCW 70.95E. The Hazardous Substance Tax is a result of the Model Toxics Control Act, approved in a voter initiative in 1988 and then codified into statute RCW 70.105D. While amending legislation presents a hurdle, we feel that it would be less difficult than proposing entirely new legislation. Environmental fees and taxes have great potential to provide strong incentives for changes in behavior but they cannot be initiated solely by Ecology staff; legislative changes are necessary.

The fees and taxes provide funding for important programs operated by Ecology and by local governments. The State Toxics Control Account gets the bulk of its funding from the Hazardous Substance Tax. The Account is used to cover state expenditures on toxic cleanups, to provide technical assistance to private parties responsible for cleanup, to promote pollution prevention, issue permits, run public information programs, and other activities. With any changes to the tax, the legislature would need to ensure that revenues generated were adequate to run these programs. One possible advantage of the change we propose is that it may avoid the wide swings in revenue that currently exist with the tax being based on product value. Removing petroleum products and changing to a dollar per pound basis could help stabilize revenues. (Lost revenues from petroleum products could be made up in other taxes such as the oil spill tax and others.) However, we emphasize that the purpose of the policy reforms we are suggesting is to change behavior in such a way that the use of hazardous substances and generation of hazardous wastes is reduced. Our focus here is on that aspect of reform rather than the funding of state programs.

The changes will need to be phased in over time, especially the removal of the caps on hazardous waste fee payments and the change in the hazardous substance tax. In addition, a detailed study by Ecology will be necessary to understand the revenue impacts of these changes. We are not proposing that total revenues be either increased or decreased as a result of these changes. It will be possible to change the structure of the fees and tax without noticeably changing revenues.

In pursuing these policy reforms, it would be essential that Ecology reach out to both industry and to the environmental community. Both groups would need to understand the benefits that the reforms would provide. As we stated above, there are likely to be winners and losers with the changes we suggest to the Hazardous Waste Planning Fee, thus it will be very important for Ecology to engage in a dialogue with firms to explain how the new fee would work. Furthermore, technical assistance should be provided to help firms find ways to change their waste management practices so that they can reduce their fee payments.

## JUSTIFICATION AND ASSESSMENT

Pursuing this reform is a potentially lengthy process with a relatively high risk of failure and a longer-term time frame needed to achieve success. However, the consultant team recommends pursuing this initiative because of the compelling economic and environmental benefits associated with reform and the poor incentive properties of the current system. In fact, many stakeholders recognize the problems with the current system, indicating that there may be a reasonable level of support for initiating a reform process. Ecology itself has published documents outlining the possibilities for reforming the system.<sup>14</sup> Fundamentally, replacing the current hazardous waste fee system with an incentive based system represents the best current opportunity for Ecology to move towards incentive based tax policy.

This incentive package – restructuring the hazardous waste fees and the Hazardous Substance Tax – is recommended for a number of reasons:

1. Effectiveness and cost-effectiveness of a hazardous waste fee that is directly assessed per pound of waste generated and that has a rate which varies depending on end-of-life management method chosen;
2. Proven effectiveness of a fee that varies with management method, based on results in other states.
3. Combining a tax on bad behavior and subsidy for good behavior is a method long suggested by environmental economists and particularly appropriate for hazardous wastes; our suggestion fits this framework;
4. Per-pound tax on hazardous substances in products more effective and cost-effective than existing ad valorem tax;
5. Directly targets the environmental problem and impacts all polluters; and
6. No new legislation required, only changes to existing laws.

The challenges posed by this incentive package include:

1. Difficulty with certain stakeholders who will see higher fee and tax payments to the government;
2. Slightly higher administrative costs for the Hazardous Waste Planning Fee that varies with waste management method chosen; and
3. Higher costs for industry complying with the Hazardous Waste Planning Fee because they must track and report their waste management activities.

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<sup>14</sup> See Issue Paper #3 in the “Beyond Waste” series, available to download at <http://www.ecy.wa.gov/beyondwaste/conabstract.html>. See also “Beyond Waste Issue Paper: Fee Systems” published by Ecology in September 2003, available at <http://www.ecy.wa.gov/biblio/0304046.html>.

## **RECOMMENDATION #4: SUPPORT LONGER-TERM CHANGES TO MATERIAL MARKETS**

### **INTRODUCTION AND OVERVIEW**

In the long term, the most transformative incentives are likely to be those that create fundamental changes in the way materials are produced, used, bought, and sold. Although our team has researched and identified incentives to encourage such a transformation (such as restructuring the hazardous waste and materials fees and taxes, Recommendation #3), a larger, cultural shift would be necessary to bring about lasting change. Our team has identified three existing trends that have the potential to significantly transform the material economy.

### **HOW WOULD IT WORK/IMPLEMENTATION**

#### ***1. Cap and trade programs for greenhouse gas emissions***

Washington and other western states are already pursuing strategies to limit greenhouse gas emissions. In November 2004, the governors of Washington, Oregon, and California, approved a series of recommendations to reduce greenhouse gas emissions. Among other pursuits, the governors agreed to explore adopting goals for state greenhouse gas emissions reductions and developing a market-based carbon allowance program (i.e. carbon-based emission trading program). Furthermore, Washington has already taken initial steps to create tradable carbon markets. In spring 2004, Washington Governor Locke signed House Bill 3141, which will require new power plants to offset 20% of their CO<sub>2</sub> emissions.

A greenhouse gas trading system could have broad applicability to Washington, and provide a strong incentive for a variety of environmental improvements, including waste reduction, decreased virgin material use, and pollution prevention. In particular, the following waste and resource-related opportunities could gain Washington industry or government carbon credits: reforestation and sustainable forestry; increased recycling and composting; use of recycled materials in manufacturing; use of recycled materials in construction, and bioenergy. Ecology could collaborate with other state agencies to pursue carbon caps, establish carbon markets, and enable companies who perform the above practices to sell carbon credits. Greenhouse gas reductions are being pursued by the western governors, by numerous individual cities in Washington, and by non-profit entities such as Climate Trust. Rather than start a separate greenhouse gas initiative or incentive program, we recommend that Ecology lend support to the work of other agencies involved and explore ways to procure greenhouse gas credits for practices that reduce waste, pollution, or use of virgin materials, consistent with this project's goals.

Cap and trade programs could also be developed for other materials, such as mercury or regulated chemicals.

## **2. Resource management contracting**

Using resource management (RM) contracting, waste management firms are compensated based on success at reducing waste rather than on the quantity of waste disposed. Resource management contracting addresses an essential and often overlooked approach to waste reduction: the contractual relationships between waste generators and waste management service providers. Contracts are pervasive in the commercial/industrial waste management field and directly influence the way the vast majority of businesses manage their waste. Unlike traditional solid waste service contracts, a resource management approach compensates waste contractors based on performance in achieving the organization's waste reduction goals rather than the volume of waste disposed. As a result, resource management contracts align the interests of generators and haulers so that they share the financial benefits of cost-effective resource efficiency through prevention, recycling, and recovery.

RM contracting is similar to performance-based contracting that has been used in the energy and the chemical purchasing, use, and management industries for a number of years. Under RM contracting the contractor takes responsibility for managing a company's waste and is paid a set fee, at or below the company's current waste management costs. The contractor adopts the risk for waste management but also gains financial rewards for making it more efficient. The efficiency gains are shared between the contractor and the business.

RM contracting recognizes that waste management is not part of the core business or expertise of most companies. Through an RM contract, the contractor provides the waste management expertise and has a vested interest in minimizing waste.

While much of the benefit from RM contracting, particularly in the early phases of a program, will likely be in higher recycling rates, over time the strategic alliances formed may enable RM contractors to influence upstream decisions related to product design and material choice, use, and handling, not just disposal practices. This upstream focus will be necessary for RM contracting to achieve more significant waste reductions and contribute to Ecology's Beyond Waste ambitions.

Ecology could play a key role in introducing RM to commercial and industrial entities throughout the state through education, technical assistance, and other mechanisms. Moreover, other incentives for companies successfully implementing RM contracts might include B&O tax reductions or some sort of regulatory flexibility. Also, fees or taxes on waste generation or disposal could incentivize RM. A key challenge is to help create a sustainable, long-term market for RM services so waste management firms develop RM capabilities. To accomplish this may require resources from Ecology to educate and motivate both potential customers and suppliers of RM services. The goal should be to develop and implement a critical mass of RM programs so that customers and RM service providers will perpetuate RM contracting activity without significant further resources from Ecology. The state could play a major role in jump-starting this process by adopting RM contracting for waste management services at state facilities.

Resource management contracting is gaining traction in the private sector. Waste Management, Inc. has been expanding its resource management services and local entrepreneurs have formed profitable businesses, such as Corporate Recycling

Services.<sup>15</sup> The EPA promotes resource management contracting on its WasteWise website.<sup>16</sup> We recommend that Ecology include information on resource management contracting in its existing education and technical assistance efforts.

### **3. Product stewardship**

Product stewardship is the principle that producers take responsibility for minimizing their products' environmental impact throughout all stages of the products' life cycle. The rationale behind product stewardship is that there is large opportunity for waste minimization in the production phase, and local governments often bear a large financial burden for managing waste. Product stewardship both reduces waste and shifts costs to those responsible for creating it.

Ecology action to encourage product stewardship could focus on legislation targeting specific significantly hazardous or voluminous waste streams, or the agency could establish a broader framework for producer responsibility. The most effective legislation, such as Minnesota's, establishes a process such that a variety of products can be included in product stewardship activities.

Incentives for product stewardship can be mandatory or voluntary, and include advanced disposal fees; tax reductions or feebates; product charges; mandatory take-back programs; education for consumers; regulatory responsiveness; recognition programs, market development plans; grants; and government procurement policies. Currently, the most comprehensive state programs require manufacturers to meet product stewardship goals, but allow them to meet those goals in a flexible manner. Mandatory reporting, waste reduction, and incorporation of waste management costs can be coupled with positive incentives such as technical assistance, education for consumers, and recognition programs.

Washington already undertakes significant activity in order to promote product stewardship, mostly consisting of voluntary assistance and incentives (Ecology, 2002). In April 2002, Ecology recommended that Washington develop an aggressive product stewardship legislative package. Such a package would establish priority products and prohibit state purchase of these products. In addition, Ecology recommended establishing tax policies that ensure that the price of a product reflects the full cost of production. Experience from other states shows that it is important to provide incentives for consumers to recycle and reuse; solely requiring producers to incorporate the costs of waste management tends to shift costs to consumers and does not alone encourage recycling and reuse.

Product stewardship continues to be pursued by Ecology and other agencies for electronics, carpet, paint, and other materials. We recommend Ecology strengthen its support of these efforts and the long-term changes towards increased producer responsibility.

To compliment product stewardship efforts, Ecology could pursue enhanced product labeling. EPA already includes labeling as part of the Energy Star program which promotes energy-efficient appliances, computers, and other products.

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<sup>15</sup> In the interest of full disclosure, please note that Cascadia Consulting Group has recently begun offering resource-management-type services in Washington State in collaboration with Corporate Recycling Services.

<sup>16</sup> <http://www.epa.gov/epaoswer/non-hw/reduce/wstewise/wrr/rm.htm>

EPA and others have recognized that the environmental attributes of products (and their manufacturing processes) can be represented in the marketplace in various ways, including:

- Shelf labeling (also called private labeling), in which stores promote environmentally-oriented products;
- Environmental marketing claims on product labels or in advertising;
- Warning, hazard, or negative labeling, usually required by a government agency;
- Seals-of-approval, awarded by a third party (e.g., Green Seal), which identify products or services that meet the program's standards;

Outside the United States, many governments have implemented mandatory environmental labeling programs, including Canada and the European Community. Generally, the programs operate on the assumption that better information will enable consumers to make more informed purchasing decisions. An environmental marketing message communicated through a label can focus consumer buying power on specific environmental concerns, providing a clear incentive for manufacturers to change to more benign materials and production processes.<sup>17</sup>

As Washington has adopted mandatory labeling for fluorescent lamps because they contain mercury, Ecology should consider labeling requirements for other products containing highly toxic or difficult to manage wastes, such as persistent bioaccumulative toxics (PBTs) or pesticide constituents.

## **JUSTIFICATION AND ASSESSMENT**

Cap and trade programs for greenhouse gasses, product stewardship, and resource management contracting are three incentives that are likely to be very effective and very cost-effective (our team gave a 4 out of 5 rating for both effectiveness and cost-effectiveness for all three of these incentives, as documented in Appendix C.)

In the short term, the feasibility of both cap and trade and product stewardship approaches is rather low; however, momentum and acceptance is clearly building and other processes are addressing them. Our analysis concludes that Ecology should lend support to these trends and look for opportunities to encourage their rapid adoption.

Resource management contracting also has feasibility barriers. The state's franchise system, for example, limits the opportunities for companies with new approaches to enter the waste management arena in Washington. Furthermore, the vertical integration of the franchised haulers limits the financial benefit of recycling versus disposing. Neither of these facts is likely to change in the short term given the significant political position of the waste hauling industry. As a result, we recommend that Ecology promote resource management contracting and look for means to advance its market share, as opportunities arise.

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<sup>17</sup> Summarized from U.S. EPA website on Environmental Messages in the Marketplace

## RECOMMENDATION #5: INSTITUTIONALIZE AN INCENTIVE APPROACH AT ECOLOGY

In general, industry perceives Ecology to be an adversary rather than an ally. Although exceptions certainly exist, this general perception is detrimental to Ecology's efforts to foster strong working relationships and develop effective incentives.

Given the current business and political climate (both locally and nationally), a significant shift in Ecology's focus and staff resources may be needed to develop truly effective partnerships with industry. Investing in industry innovation (as described in Recommendation #1) is clearly a significant step in the right direction. But other steps are also warranted.

During stakeholder interviews, industry representatives questioned what the problems were that Ecology is seeking to solve. From their perspective, an appropriate course of action would be to identify specific problems within each industry and then work to develop targeted incentives and approaches for those problems. System-wide incentives, although not without merit, may be harder to justify to industry. Furthermore, system-wide incentives – if not sufficiently large and embedded in day-to-day industry operations – may not result in large outcomes.

As a result of these stakeholder perspectives, as well as due to significant research and experience with industrial ecology approaches (Marian Chertow, personal communication, June 2005) and economic theory<sup>18</sup>, our team recommends that Ecology institutionalize an incentive approach within its operations.

### HOW IT WOULD WORK/IMPLEMENTATION

As described above, there is a significant body of opinion and research that incentives are best-received and most effective if highly targeted. Yet the knowledge about what specific wastes exist in each industry is very specialized and concentrated – in the employees of that industry. Accordingly, Ecology would likely be most effective at developing sector-focused initiatives by partnering with the affected industries.

Such an approach may require significant change within Ecology. Stakeholders report that they would likely be distrustful of Ecology staff working with them on-site, particularly because the Ecology staff could use the opportunity to identify violations. Opportunities may exist to involve third-party organizations in compliance activities, technical assistance, or general outreach to industry. However, while third-party organizations may be met by industry with a higher level of trust, involving them would not necessarily improve industry perceptions of Ecology.

We recommend that Ecology:

- **Examine ways that internal resources can focus more strongly on fostering a culture of positive engagement and partnership with industry.** Changing

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<sup>18</sup> A longstanding result in environmental economics is that you need as many policy instruments as you have policy objectives (Margaret Walls, Resources for the Future, personal communication, May, 2005). Accordingly, system-wide incentives may be less effective than more highly-targeted ones.

the relationship with industry to improve trust and mutual respect is, we believe, a prerequisite to effective implementation of many types of incentive policies. This does not mean that Ecology shirks its responsibility for enforcement. In fact most stakeholders support full, even-handed enforcement of existing laws. Ecology should examine ways that internal resources (staff and budgets) can be reallocated to focus more strongly on incentives for superior environmental performance while maintaining compliance responsibilities.

- **Develop a “design-build” process to share responsibility with specific industry sectors for developing incentives for specific problems.** We envision a process by which Ecology and specific industries share responsibility for developing incentives for specific waste or material-related improvements. Ecology could define the overall parameters, provide a “toolkit” of incentives, and help set performance goals that the incentives must achieve. Industry could help define specific problems, develop its own incentives, propose performance and accountability measures, and ultimately innovate to solve the problems at hand. Other stakeholders, such as other government agencies or nonprofits, could also be involved.

The toolkit of incentives could include a variety of mechanisms, such as B&O tax incentives, regulatory responsiveness or streamlined permitting, low-interest loans, expanded government procurement of Washington-produced recycled-content products, specialized technical assistance, labeling or certification requirements, and grant funding for R&D projects.

Please note that this recommendation affirms a previous recommendation to Ecology to develop sector-specific strategies. The Beyond Waste Consultant Team’s Issue Paper *Moving to Beyond Waste in the Industrial Sector* (Ross and Associates and Cascadia Consulting Group, 2003) would be an excellent resource on this topic.

- **Adapt the agency’s administrative procedures for rule-making to incorporate incentive approaches.** In addition to establishing this internal capacity on incentives, Ecology could also adapt its administrative procedures to incorporate an incentives component to developing rules and implementing legislative directives. Under this approach, Ecology would determine what, if any, incentives could be employed as an alternative or complement to regulations to achieve a desired (or legislated) environmental outcome. For example, Ecology is currently developing an action plan for PBDEs that may include a ban on selected flame retardants. Ecology is also developing a plan to better manage electronic wastes. Both of these processes involve stakeholders in assessing the problem and developing solutions. Both could readily include an explicit consideration of how incentives such as tax credits or voluntary measures could be employed.

## JUSTIFICATION

Businesses are primarily concerned with their own self-interest, a force that brings significant potential for accomplishing results. Instead of viewing self-interest as a force to overcome, policy-makers can achieve extraordinary results by harnessing this self-interest for environmental objectives. Doing so, however, requires working very closely with industry to determine where their interests overlap with Ecology’s and how collaboration can bring collective benefit. Industry members know their materials and

processes better than anyone, and hence choices of target wastes and appropriate incentives will be most effective if they originate from, or significantly involve, industry.

Please note that this recommendation for internal change is derived primarily from the input received from external stakeholders. The consultant team did not interview Ecology staff or conduct an organizational or process study to determine what changes were needed, if any, at Ecology and how to implement them. Hence this recommendation should be considered a starting point for further internal review and capacity building in light of the Beyond Waste objectives and the commitment to an incentive based approach by Ecology.

# POSSIBILITIES FOR FUNDING INCENTIVE INITIATIVES

## INTRODUCTION AND OVERVIEW

Several of the initiatives that we have proposed in our packages of recommendations will require significant amounts of Ecology staff time as well as resources to pay for awards, certification, grants, and other incentives. Our suggested B&O tax credit for secondary materials use, part of our “Green Track” package, and the research grants, “golden carrots,” and low interest loans in Recommendation #1 will all require direct financial resources. Staff time to administer the programs will also be necessary. Our first proposal in Recommendation #1, the collection and dissemination of information on material and energy flows in Washington, will require substantial amounts of staff time to develop and manage an extensive reporting system. Likewise, in Recommendation #1, we suggested the expansion of IMEX and as part of Recommendation #2, we proposed expanding the EnviroStars Program and creating an Environmental Results Program, both of which will require staff time to develop and administer.

In some of these cases, it might be best to try and move some staff resources away from existing activities – some compliance-related jobs, for example – toward more of the incentive-based activities. Doing this would also help to achieve some of the goals of Recommendation #5, “Institutionalizing an Incentive Approach at Ecology.” However, it is unreasonable to think that all of these changes we are putting forth here could be implemented within Ecology’s existing budget.

A basic finding in the public finance field of economics is that financing of government programs should be done with taxes that generate the lowest possible “deadweight loss” (or marginal excess burden or efficiency cost) to society. In general, lump-sum taxes, broad-based taxes, and taxes on goods that are inelastically demanded – i.e., for which a given percentage increase in price leads to a very small percentage reduction in the quantity of the good demanded – tend to have the smallest deadweight losses. On the other hand, it has been argued that linking taxes to the programs they are funding appeals more to the general public and helps to make taxes more acceptable. So, for example, a chemical and petroleum products feedstock tax was used to fund the Superfund program. The Hazardous Substance Tax in Washington, as explained above, funds the state’s Toxics Control Account. There are many examples of such programs at both the state and federal level.

In Washington, there are a couple of possibilities for funding the incentive programs we have outlined. First, a surcharge could be imposed on all solid waste collected commercially and received from self-haulers at transfer stations and landfills. A 1% surcharge (equal to what was employed between 1989 and 1995 to fund the state’s recycling and market development initiatives) could generate at least \$5 million in annual revenue.<sup>19</sup> While a small increase would be unlikely to lead to large reductions in waste disposed (nor, thankfully, increases in illegal dumping), it could be relied upon to provide funding for these Beyond Waste incentive programs. There are limits, however, to the

<sup>19</sup> In the 93-95 biennium, the 1% surcharge raised approximately \$10.6 million or \$5 million per year collected under authority granted through RCW 82.18.020. Currently state fees are imposed on waste with the funds going into the Public Works Trust Fund so the mechanism to implement this fee is already in place.

size of the surcharge. If fees get too high, increases in illegal disposal and out-of-state shipments may take place.<sup>20</sup>

A second possibility is to have the hazardous waste fees or the hazardous substance tax raise additional revenues to fund Ecology incentive programs. We are already proposing reforms to these two fee/tax programs, thus using the revenues they generate to help fund waste-reduction programs could be worthwhile. The proposed changes could be revenue neutral, or they could increase revenue to the state and fund the additional resources required by Ecology.

A final possibility could be to increase in the state's litter tax , paid by grocery stores and other retailers and used to fund litter cleanup and related activities. Alternatively the scope of this tax could be expanded, with more businesses subject to the tax. However, this tax is already closely scrutinized and any increase or expansion would be likely to be met with strong resistance. Also, the landfill surcharge would be a more broadly-based tax and appears to be more acceptable to most stakeholders.

A good example of a solid waste fee being used to fund innovative waste reduction and efficiency programs is found in the United Kingdom where a tax on tons disposed has been imposed to finance new waste management initiatives. In developing this program, the government consulted extensively with business stakeholders to determine how to "recycle" funds back to industry to fund waste management initiatives. This tax is scheduled to increase from £14 per ton to a maximum of £35 per ton over the long term (HM Treasury, 2003).

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<sup>20</sup> Stakeholders interviewed had a variety of responses to the proposal to increase solid waste tip fees as a way to fund incentive programs. Many industry representatives were opposed to new taxes – period – but others thought that if the money is used wisely a solid waste surcharge is a reasonable way to raise revenues. Local government stakeholders recommended that the tax be structured in such a way that revenues be collected on out-of-state long haul waste, not just waste landfilled in Washington. They suggested a fee on collection as opposed to disposed tonnages. Others recommended a collection tax to ensure sustainability in the face of declining solid waste tonnages and commensurate fees associated with effective recycling and waste reduction programs.

## 4. Roll-Out Strategy

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The previous chapter describes the consultant's five recommendations for industrial incentive packages for waste reduction and pollution prevention. However, given the diverse nature of the incentives recommended and the need to build early successes, we have assembled a suggested timeline for implementation as presented below. This plan should be considered as a starting point for discussions within Ecology on how best to proceed. Ecology management and staff know best what it will take to move forward internally with these proposed incentives as well as the relationship between possible incentive policies for Beyond Waste and other incentive strategies under consideration by other divisions within the Department.

### SHORT-TERM ACTIONS (0 TO 1 YEAR)

- **Craft a legislative package designed to appeal to diverse stakeholders that will jump start implementation of the incentives approach.** With an apparent high level of interest in pro-active environmental policies from the business community, now may be the time to pursue legislation that will both authorize and fund incentives as a way to achieve Ecology goals. This package will necessarily be broader than Beyond Waste, but can include several of the recommendations put forth in this report. The proposed B&O tax credit for secondary material use could be a cornerstone of this package, perhaps expanded, as has been proposed, to also include rewards for superior performance on other environmental metrics. Other recommendations from this report that might be included in a legislative package are: 1) funding for an innovation grants program, perhaps linked to the Prosperity Partnership's Clean Technology cluster strategy and to the new Ecology focus on toxics reduction; 2) design and initial pilot or case study implementation of an Environmental Results Program targeted at selected small and medium sized businesses; 3) funding for expansion of EnviroStars; and 4) funding for a Beyond Waste innovations pilot targeted to a specific industry or material flow.

Based on our stakeholder research, this type of a package would likely appeal to both large and small businesses and could, most likely, be shaped to appeal to environmental and local government interests as well. Representatives from these sectors should be engaged from the outset, to increase the chance for success in the legislature. Passage would propel Ecology forward towards successful implementation of an incentives approach early in the term of the new Director and Governor.

- **Select one or perhaps two material streams and industries for case study implementation of the Innovations program recommendations.** Whether or not incentives legislation moves forward in the next short legislative session, we recommend that Ecology select a discrete set of materials and/or industries to begin to apply the innovation incentive approaches presented in this report. Ecology can start by reviewing available data and identifying candidates based on quantities of material flows and a rapid assessment of potential for material exchange and secondary material use. Much of this information already exists

within the Beyond Waste program and the Industrial section – it now needs to be analyzed to find the highest potential candidate sectors.

With this assessment completed, Ecology will be in a position to reach out to industry representatives and relevant trade associations to solicit voluntary engagement in its innovations initiative. Businesses can be enticed to participate by offering them the chance to be in on the “ground floor” of developing the new program and benefiting in terms of grants, regulatory relief, tax credits, and other incentives that will emerge from the effort. Once underway, this effort could lead to new legislation or perhaps could be implemented within existing administrative and legal authority. Additional resources will likely be required for full implementation. Possible sources of funding include revenues from the toxics account, EPA grant funds, or a new fee, such as a surcharge on solid waste.

The end goal of this effort is to have an innovations pilot program underway after one year through a partnership with industry. If successful, this pilot will then serve as a model for other initiatives with other larger industries and material flows.

- **Form an incentive “Action Team” within Ecology.** The final recommendation for the next year is for Ecology to create some type of a task force or team to guide the development and transition to an incentives approach. The action team will likely be most effective if it includes at least some representation from or formally consults with outside parties (industry representatives or consultants). This team should work with and for Ecology management already engaged in pursuing incentives, regulatory reforms, and Beyond Waste. This group may need to have a broader focus than just Beyond Waste, yet the focus on material flows will also enable progress towards tangible outcomes. The charge to this team should be to move Ecology from theory to action on incentives, identifying barriers, devising solutions, and then monitoring and reporting on results. Some level of resources will be required to sustain this team. One of the tasks for the team will be to determine what level of sustainable funding is required, which fee structure to use to obtain those resources, and how to gain stakeholder support for the funding mechanism.

## NEAR-TERM ACTIONS (1 TO 3 YEARS)

The first year agenda described above is designed to achieve tangible action on incentives immediately. For years 1-3 we recommend that Ecology proceed systematically to implement the incentive packages proposed in this report.

- **Implement the pilot industry innovation projects developed in year 1. (Recommendation #1).** Focusing on this initiative will send a strong, positive message to industry that Ecology is taking a new approach. This initiative should lead to a more productive relationship with industry as well as result in early successes to build momentum. The pilot effort represents one area of focus. In the second year emphasis should be placed on expanding the IMEX program and developing the grants and/or “golden carrot” awards with academic and industry partners.
- **Develop the “Green Track” (Recommendation #2).** Green Track incentives will further reward businesses that make environmental improvements – perhaps

improvements that were seeded through the innovation pilot projects. In moving forward with this package, we suggest that Ecology explore synergies and possible integration of an expanded statewide EnviroStars program and the ERP program. This integration, for example, might go beyond the scope of both efforts as each program has in the past provided different levels of regulatory responsiveness depending on performance. If upon further consideration such integration proves too complex from an administrative or practical standpoint, the programs could remain separate, but care should be taken to avoid duplication.

Whether or not ERP is ultimately integrated with EnviroStars, Ecology should solicit feedback and resources from U.S. EPA's Office of Policy, Economics & Innovation (OPEI), which supports ERP initiatives at the state level (see <http://www.epa.gov/compliance/incentives/innovations/programresults.html>) and is interested in exploring innovative applications of ERP.

- **Initiate reform hazardous waste and material taxes and policies consistent with Recommendation #3.** Ecology will need to build support among industry, the legislature, and the public for these changes, many of which (such as removing caps) will need to be phased in over several years.
- **Pursue low cost strategies to achieve structural market change (Recommendation #4).** This research identified carbon cap and trade programs, Resource Management contracting, and product stewardship as three important changes that will help achieve Beyond Waste. The consultant team concluded that Ecology could lend support for these efforts and so accelerate their adoption. For cap and trade systems, Ecology can strongly support action within the Governor's office and with other regional state governments as well as non-profit entities to lay the groundwork for a regional trading system or full participation in a national trading system, whichever comes first. New information and documentation systems will be needed for this market to exist. Ecology can start to build this system, beginning by quantifying the carbon savings already achieved through recycling and waste prevention at the industry level. For Resource Management Contracting, Ecology can promote this concept to the private sector, work with UTC to facilitate its adoption statewide, and have the state government adopt the practice internally. For product stewardship the recommended strategy in the near term is for Ecology to 1) continue applying product stewardship principles to devising solutions to specific material streams such as electronics and 2) facilitate industry acceptance of the product stewardship approach through dialogue and incentives.
- **Pursue institutionalization of the incentives approach,** following through on efforts initiated by the Action Team. Within 2-3 years a dedicated funding source for incentive policies and programs may be essential to continue with implementation. Ideally Ecology will have strong support from a critical mass of stakeholders, including industry, to achieve legislative support for this funding mechanism.

## LONGER-TERM ACTIONS (3+ YEARS)

- **Evaluate the effectiveness and cost-benefit of the incentive policies and programs that have been implemented in the first 3 years to determine net**

**benefits and what revisions, if any, are required to the existing incentive policies.**

- **Complete the reform of the hazardous waste and material taxes and policy recommendations.**
- **Complete Ecology's transition to an organization that uses incentives in conjunction with command and control measures to achieve Beyond Waste and other environmental outcomes efficiently, in partnership with industry, and at least cost to society.**

## **CONCLUSION**

Moving forward with an incentives approach to achieving Beyond Waste will take sustained effort by the Department of Ecology both to achieve adequate stakeholder support and to develop internal capabilities needed to complement the compliance and regulatory systems now in place. In recent years, Ecology has devoted significant resources to researching and identifying ways to move forward. Much progress has been made in understanding where and how incentive policies can be applied to achieve environmental benefits; now is the time to act.

The incentives packages recommended in this report are intended to provide Ecology with viable, effective, equitable, and efficient policies and programs that can be implemented. The specifics will need to be customized and shaped in the months and years to come to achieve success – both internally by Ecology and through engagement with stakeholders and legislators (when new laws or funding is required). But from the research conducted for this study we have concluded that these are very good places to start and that Ecology can expect to achieve success if the recommendations are pursued.

We found through our research that there are no silver bullets – incentives that are universally acclaimed, that can be readily implemented through legislation or otherwise, and that will achieve significant system-wide change in either the short or long term. What we did find was that stakeholders are receptive to incentives as a policy tool and also that the way to implement incentives may be as much through making internal program changes as through enacting new legislation. Further, we concluded that there are two viable models on which to base incentives: 1) the collaborative model – where Ecology forges partnerships with industry and facilitates Beyond Waste outcomes and 2) the financial model – where incentives are created that send direct price signals to industry.

If Ecology is successful with this incentives approach we can envision the time – perhaps in 2010, but certainly no later than 2020 – where robust public-private partnerships and economic incentive based instruments are a viable, effective alternative to command and control mechanisms. Regulations do not go away – indeed they are essential to the effectiveness of some incentive policies – but the need for enforcement is lessened. In this vision of the future, Ecology staff become as well known for their skill as facilitators of Beyond Waste outcomes as they are currently known as enforcers of important but sometimes cumbersome rules and regulations. Furthermore, businesses accept and even welcome incentive-oriented tax policies as a least cost, beneficial means to protect the environment.

The ultimate purpose is to achieve the Beyond Waste vision – where waste and the use of toxics are dramatically reduced, and cradle to cradle material flows sustain a vibrant economy, a highly competitive Washington industrial sector, and environmental excellence in this state and beyond.



## 5. Appendices

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This section contains the following appendices:

- **Appendix A – Incentive Descriptions.** Descriptions of the twenty incentives assessed by the consultant team, plus listing of some additional incentives suggested by Washington stakeholders.
- **Appendix B – Incentive Assessment Criteria.** Description of the criteria used to rate the twenty incentives.
- **Appendix C – Summary Incentive Ratings.** Summary of the consultant team’s qualitative ratings of the twenty incentives.
- **Appendix D – Summary of Stakeholder Perspectives.** General lessons learned from stakeholders as well as specific comments on each of the twenty incentives.
- **Appendix E – Lessons from Environmental Economics.** Seven short papers by Margaret Walls of Resources for the Future on how lessons from environmental economics apply to this project.
- **Appendix F – National Research Methodology and Key Results.** Describes the focused literature scan and internet search of waste reduction incentives from throughout the U.S.
- **Appendix G – Incentives Matrix.** The compilation of incentive policies uncovered in the national research described in Appendix F.
- **Appendix H – Final Presentation.** Presentation materials discussed with Ecology Senior Management on June 27, 2005.



# Appendix A.

## Incentive Descriptions

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This appendix presents short descriptions of the twenty incentives identified by the consultant team for further analysis, as well as a list of some additional incentives suggested by Washington stakeholders.

### REGULATORY RESPONSIVENESS

- 1. Expand range of regulatory responsiveness incentives.** The EPA's Performance Track program "designed to recognize and encourage top environmental performers – those who go beyond compliance with regulatory requirements to attain levels of environmental performance that benefit people, communities, and the environment." In May of 2004, EPA and Ecology entered into a memorandum of agreement to jointly implement the National Environmental Performance Track Program in Washington State. As part of this agreement, Ecology agreed to help increase local enrollment in the program and develop regulatory incentives for participation. For example, as of January 1, 2005, Performance Track facilities will be allowed longer waste accumulation times and reduced inspection frequencies if they comply with more rigorous waste-management and pollution-prevention standards.

Washington could expand its regulatory responsiveness program in conjunction with or parallel to Performance Track. Many states (e.g., Texas, North Carolina) offer a range of incentives depending on the business' level of commitment. Possible incentives include reduced fees for training and permits, streamlined reporting, reduced inspections, and exemption from planning requirements. Others (e.g., Virginia) are more narrowly focused with a single or very limited set of incentives for a particular environmental commitment or improvement. Based on experience from these states, Washington could explore a broader set of incentives in conjunction with the enhanced effort with EPA's Performance Track. Which incentives are most appropriate for Washington will depend on the existing regulatory requirements and fee structure.

- 2. Certify "green" practices or companies and reward these companies with streamlined permitting or other regulatory responsiveness.** Businesses who regularly go "beyond compliance" and for whom green is standard practice often complain about the lack of trust they are shown by the government when it comes to regulatory requirements, such as permitting. One solution to this could be to offer green certifications to businesses and offer streamlined permitting or regulatory burden for these businesses. One particularly promising industry for this approach could be the building industry, in which green contractors could perhaps receive priority permitting. This option has significant overlap with programs such as EPA's Performance Track, also discussed in option 9
- 3. Greenhouse Gas emissions cap & trade** – Washington and other western states are already pursuing strategies to limit greenhouse gas emissions. In November 2004, the governors of Washington, Oregon, and California, approved a series of

recommendations to reduce greenhouse gas emissions. Among other pursuits, the governors agreed to explore adopting goals for state greenhouse gas emissions reductions and developing a market-based carbon (i.e. greenhouse gas) allowance program (i.e. greenhouse gas trading program). Furthermore, Washington has already taken initial steps to create tradable carbon markets. In spring 2004, Governor Locke signed House Bill 3141, which will require new power plants to offset 20% of their CO<sub>2</sub> emissions. A greenhouse gas trading system could have broad applicability to Washington, and provide a strong incentive for a variety of environmental improvements, including waste reduction, decreased virgin material use, and pollution prevention. In particular, the following waste and resource-related opportunities could gain Washington industry or government carbon credits: reforestation and sustainable forestry; increased recycling and composting; use of recycled materials in manufacturing; and use of recycled materials in construction. Ecology could collaborate with other state agencies to pursue carbon caps, establish carbon markets, and enable companies who perform the above practices to sell carbon credits.

- 4. Increase recognition programs for businesses with strong environmental performance.** As part of our stakeholder research, business representatives called for more recognition programs by the state to identify and publicize businesses who are doing the “right thing” or who are environmentally responsible. Stakeholders reported that recognition generally matters most to businesses that are selling a product (e.g., not Boeing sub-contractors), to larger waste generators, and to businesses who are experiencing public relations problems with nearby communities. EnviroStars is an example of a successful local government program currently operating such a program.

## MARKET-BASED

- 5. Improve/expand Washington’s materials exchange programs.** The Industrial Materials Exchange, or IMEX, is a regional (Washington, Oregon, and Idaho) listing service where companies can buy and sell raw materials, surplus, or byproducts. The list is published online and in print form, and includes listing for chemicals, equipment, metals, sludges, building materials, oils, paints and coatings, plastics and rubber, textiles, wood, and paper. Other materials exchanges also exist in Washington at the local level, and they are organized collectively on a website called 2good2toss.com. Despite the existence of IMEX and 2good2toss, anecdotal evidence indicates that the resources are not widely used for large quantities of material. Ecology efforts could focus on making the system more user friendly, or on assigning a staff person to help facilitate deals between buyers and sellers.
- 6. Resource management contracting.** Resource management (RM) contracting addresses an essential and often overlooked approach to waste reduction: the contractual relationships between waste generators and service providers. Contracts are pervasive in the commercial/industrial waste management field and directly influence the way the vast majority of businesses manage their waste. Unlike traditional solid waste service contracts, a resource management (RM) approach compensates waste contractors based on performance in achieving the organization’s waste reduction goals rather than the volume of waste disposed. As a result, RM contracts align the interests of generators and haulers so that they share

the financial benefits of cost-effective resource efficiency through prevention, recycling, and recovery.

Ecology can play a key role in introducing RM to commercial and industrial entities throughout the state through education, technical assistance, and other mechanisms. Moreover, other incentives for companies successfully implementing RM contracts might include exemption from the B&O tax, or some sort of regulatory flexibility. Also, fees or taxes on waste generation or disposal could incentivize RM. A key challenge is to help create a sustainable, long-term market for RM services. Ecology would clearly need to work closely with the WUTC to provide incentives compatible with the WUTC's oversight.

- 7. Product stewardship requirements.** Product stewardship is the principle that producers take responsibility for minimizing their products' environmental impact throughout all stages of the products' life cycle. The rationale behind product stewardship is that there is large opportunity for waste minimization in the production phase, and local governments often bear a large financial burden for managing waste. Product stewardship both reduces waste and shifts costs to those responsible for creating it. Legislation can be targeted to specific significantly hazardous or voluminous waste streams, or it can establish a broader framework for producer responsibility. The most effective legislation, such as Minnesota's, establishes a process such that a variety of products can be included in product stewardship activities.

Incentives for product stewardship can be mandatory or voluntary, and include advanced disposal fees; product charges; mandatory take-back programs; education for consumers; regulatory responsiveness; recognition programs, market development plans; grants; and government procurement policies. Currently, the most comprehensive state programs require manufacturers to meet product stewardship goals, but allow them to meet those goals in a flexible manner. Mandatory reporting, waste reduction, and incorporation of waste management costs can be coupled with positive incentives such as technical assistance, education for consumers, and recognition programs.

Washington already undertakes significant activity in order to promote product stewardship, mostly consisting of voluntary assistance and incentives. For example, in April 2002 Ecology recommended that Washington develop an aggressive product stewardship legislative package. Such a package would establish priority products and prohibit state purchase of these products. In addition, Ecology recommended establishing tax policies that ensure that the price of a product reflects the full cost of production. Experience from other states shows that it is important to provide incentives for consumers to recycle and reuse; solely requiring producers to incorporate the costs of waste management tends to shift costs to consumers and does not alone encourage recycling and reuse.

## FINANCIAL

- 8. Offer a Resource Conservation Credit on the B&O tax.** The Federal Government offers corporate income tax deductions for firms that exploit natural resources, such as petroleum (the Petroleum Depletion Allowance), minerals (the Mineral Depletion Allowance), and timber (Timber depletion allowance). Although removing these depletion allowances from the Federal Tax Code is beyond Washington's capability,

local tax incentives could be offered to help level the playing field for companies that use recycled feedstocks rather than virgin resources. The state could therefore offer a “resource conservation credit” on the state B&O tax to “Beyond Waste” manufacturers that utilize secondary materials in their manufacturing process.

- 9. Fund R&D for Beyond Waste innovation.** Although Washington cannot give grants to private companies, it can give grants to State universities or labs for R&D projects conducted in partnership with private companies. For example, the Washington Technology Center is a statewide economic development agency that provides matching funds to industry-university partnerships in addition to offering technical assistance. Similarly, the newly-proposed Life Sciences Discovery Fund would provide matching funds for life sciences research. Ecology could help establish a matching fund – perhaps in partnership with the UW Design for Environment Lab or other engineering department – to fund Beyond Waste innovation. A corollary to this option would be to offer low-interest loans to help fund new infrastructure or process improvements, although such loans would have to occur through a private entity due to the state’s lending of credit restrictions.
- 10. Offer “golden carrot” awards.** “Golden carrots” are large cash prizes paid to companies that bring to market a particularly desirable new technology. Golden carrots are credited with bringing about large advances in navigation, airplanes, automobiles, chemicals, electronics, and home appliances (most notably the U.S. Federal Government’s “golden carrot” for refrigerator energy efficiency). Rather than a direct cash prize, some golden carrot awards are paid out as market subsidies on the first x number of products sold by time y. The Rocky Mountain Institute has recently compiled lessons learned from golden carrots (and platinum carrots!) in its Oil End Game report. Ecology could develop a golden carrot award for specific Beyond Waste innovations.
- 11. Restructure/expand the hazardous waste fees and taxes.** Washington currently levies three types of fees and taxes on hazardous materials and wastes: (1) a 0.7% hazardous substances tax on “first possession of all hazardous substances;” (2) a per-pound hazardous waste planning fee on companies who generate more than a specified amount of certain materials; and (3) a hazardous waste education fee of \$46 per business in certain SIC codes. Both Ecology and the Beyond Waste consultant team have explored these options in detail. Options discussed include modifying or expanding the state’s Hazardous Waste Planning Fee by removing exemptions and raising the cap on the current fee; replacing both the Hazardous Waste Planning and Education Fees with fees based on substance use; replacing both the Hazardous Waste Planning and Education Fees with an expanded Hazardous Substance Tax, perhaps one that applies to more materials; and expanding the Hazardous Substance Tax to include products that contain hazardous substances.
- 12. Pursue tax shifts compatible with other ongoing tax policy discussions.** “Sin” taxes are relatively popular in today’s climate, and the B&O tax is universally disliked. Therefore, there may be an opportunity to tax pollution and waste as a “sin tax” while relieving tax burden by reducing or eliminating the B&O tax. Such a recommendation may be compatible with other ongoing tax policy discussions in Washington, such as the outcomes of the Washington Tax Structure Committee. In November 2002, the Washington State Tax Structure Study Committee recommended two major tax alternatives: (1) replace the B&O tax with a value-

added tax; and (2) create a personal income tax to reduce the state sales tax rate and eliminate the state property tax. The committee also recommended a number of incremental alternatives. This option of tax shifting has some overlap with the options above regarding hazardous waste fees and taxes.

**13. Pursue combined output taxes and recycling subsidies (i.e., deposit/refund).**

The economic literature has shown that combining taxes on output (such as tip fee surcharges, bottle deposits, or emissions taxes) with recycling subsidies (“refunds” or other financial subsidies) is a particularly efficient and effective mechanism that helps to address some of the challenges (particularly illegal dumping) associated with output taxes alone. Fullerton and Wolverton (2000) advocate the use of this type of combined tax/subsidy policy for many environmental problems in lieu of an output or emissions fee approach. They argue that in many instances, it is difficult or prohibitively costly to monitor and measure emissions, thus a true Pigovian emissions tax is out of the question. In its place, policymakers can use a combination of a tax on output and a subsidy to “clean” inputs to achieve the same outcome. Therefore, one theme we plan to explore in our recommendations to Ecology is how to bundle incentives in such a way that output taxes (or virgin material taxes) are balanced with recycling subsidies. The following two incentives (#14 and #15), for example, are purely output incentives and would best be combined with a corresponding subsidy.

**14. Expand the litter tax to fund targeted recycling and reuse programs.**

Washington’s 1971 Model Litter Control Act and its 1998 Amendments created the Waste Reduction, Recycling, and Litter Control Account within the state treasury. The account is funded through a 0.015% tax on gross sales of products or packaging that tend to create litter, such as beverages, cigarettes, groceries, and toiletries. Ecology could consider increasing the tax rate (which has not changed since 1971) or expanding the tax concept to include other items prevalent in the waste stream. Expanding the litter tax would not likely send significant market signals on its own, however, and would primarily be a source of funds for other incentives.

**15. Institute a statewide solid waste tip fee surcharge.** A statewide solid waste tip fee surcharge could increase the cost of solid waste disposal relative to recycling. However, in practice the surcharge would need to be very high to motivate significant behavior change. Therefore, a tip fee surcharge would be less of a stand-alone incentive than a fundraising technique to pay for other incentives.

## **MANDATES**

**16. Ban selected materials.** Incremental financial incentives or voluntary approaches may not be sufficient to motivate initial, widespread behavior change for certain materials. Accordingly, in some cases bans would be the most effective means at eliminating problem materials, such as mercury switches. In addition to banning products, disposal bans are another means of diverting material. Disposal bans on certain products such as beverage containers, residential yard waste, and household hazardous waste have been in effect in many states for years. Though politically difficult to achieve, often taking lengthy negotiations with key stakeholders followed by a phase-in period, such bans can have a significant impact and, in conjunction

with other incentives, warrant further consideration.<sup>21</sup> One of the key conclusion's from RFF's research is that the most effective policies will act both at the "front end" (product design, material selection, etc.) and at the back-end or "end-of-pipe" (waste generation and disposal); in this context, disposal bans may be an effective back-end component of a package of policies.

As with other diverted materials, it is important for Ecology to address the processing infrastructure and market issues associated with any banned materials.<sup>22</sup> Thus, some of the financial incentives described elsewhere in this report — reduction or exemption from B&O tax or state property tax for processing facilities, or tax-exempt bond financing could also be employed to encourage investment in processing technologies and facilities.

## LIABILITY/ASSURANCE

**17. Shift liability or financial assurance requirements** for industry associated with the use of hazardous materials. These are two mechanisms to shift legal and financial liability for hazardous spills or toxic effects onto the companies that produced the products.

- Tort liability, by forcing injurers to compensate their victims, provides incentives for potential wrongdoers to invest in safety and other precautions to reduce the likelihood that harm will occur (Cooter and Ulen, 2000). In the environmental arena, potential liability can encourage firms to reduce pollution, reduce the likelihood of accidents and spills of environmentally harmful chemicals, reduce exposure to particular chemicals, and undertake a variety of other precautionary activities. In addition, liability has a feature not shared by regulations and taxes: the damage payments directly compensate the victims of the pollution. In this way, liability has a certain fairness aspect to it that government policy does not necessarily have. Although liability creates proper incentives for precaution in a simple, theoretical sense, economists have argued that there are reasons to look beyond the simple framework. First and foremost is the fact that limited assets may shelter firms from the incentives created by liability (Shavell, 1984). In other words, if its liability costs are greater than the value of its assets, a firm can declare bankruptcy rather than pay damages.
- Financial assurance rules, also known as financial responsibility or bonding requirements, are rules that require potential polluters to demonstrate that they have the financial resources necessary to compensate for environmental damages that may arise in the future from their activities. These requirements can help to overcome the problem brought about by the availability of

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<sup>21</sup> For example, Massachusetts has developed draft regulations and completed an extensive stakeholder process to add certain construction and demolition (C&D) wastes — asphalt, brick, concrete, metal, and wood — to the list of banned materials. Though the C&D ban has not come into effect yet, the prospect of it has already had a significant impact on the construction industry with numerous building contractors implementing C&D recycling and reuse efforts and advertising their capabilities in this area.

<sup>22</sup> In Massachusetts and elsewhere, DEP successfully sought to have wood waste included as a renewable energy source in the state's renewable energy portfolio standards, thereby enhancing the market for waste wood. In anticipation of the ban and with encouragement from DEP there has been significant private investment in expanded and new C&D processing in the state. C&D processing prices in MA are now competitive with disposal.

bankruptcy. They ensure that the expected costs of environmental risks show up on a firm's balance sheet and in its business calculations and thus provide incentives for a firm to undertake necessary precautionary activities. The financial assurance concept is quite useful for providing the proper incentives to deal with particular environmental problems. Combined with liability, it helps to ensure that payments can be made to injured parties and for clean-up in the event that damages occur, and more importantly, the mechanisms themselves provide incentives for firms to take precautions and care to avoid pollution damages in the first place. Financial assurance is most useful for dealing with uncertain environmental outcomes and damages that occur in the future rather than the present. Leaking underground storage tanks, chemical spills, oil spills, groundwater contamination from landfills due to liner failure, and a host of other kinds of events are problems best addressed by financial assurance.

Ecology could work to increase liability and financial assurance requirements for Washington manufacturers.

## PROCESS AND INSTITUTIONAL CHANGE

- 18. Adapt Ecology's administrative process for incentives.** Ecology could establish an administrative process to develop specific incentives to encourage particular Beyond Waste behaviors. This process would be similar to that already used by Ecology to develop rules (e.g. PBT and PBDE rulemaking processes), but would instead be focused on "incentive making" and could result in regulatory reform, performance-based approaches (perhaps similar to what's happening in BC), recommended tax policy changes, etc.
- 19. Encourage existing industry innovation.** Many businesses, including those located in Washington State, are already taking significant action to reduce waste and the use of toxic materials. This trend has been occurring for some time and has been documented by Ecology in the Beyond Waste research and follow-up industrial focus groups. Nationally and internationally the focus on industrial ecology is stimulating even more action by businesses to reduce waste and in particular to consider ways to use by-products from one business as an input to production in another.

There are several ways for Washington to facilitate this type of industry innovation, with the intent of working with industry to move forward on a voluntary basis with further reductions (rather than using tax policies or mandates). Specifically, research has demonstrated that businesses change their behavior in response to information – either positive or negative about waste generation and the availability of new material streams for production. For example, public reporting of hazardous waste generation and emissions has led businesses to reduce those emissions. And knowledge about the availability of secondary material inputs has led businesses to utilize those inputs in their manufacturing.

Accordingly, Ecology could provide incentives to businesses by: 1) counting and widely reporting all waste flows (similar to efforts underway in Pennsylvania); 2) providing businesses with sophisticated, user-friendly information on available secondary material flows; and 3) serving in a coordinating role to facilitate industrial ecology practices by businesses. Ecology action could include mapping the material and waste flows in an industrial park or region and then actively coordinating the

materials exchange among businesses. EPA initiated and then abandoned this type of an effort in Brownsville Texas about 8 years ago, so a framework model already exists. Ecology would then take a more pro-active role than the current IMEX program to determine what materials are available and then enabling an exchange. This type of program could be pursued through close coordination with trade associations, to avoid the cynicism associated with the line: "the government is here to help". Model efforts elsewhere include programs in Pennsylvania, the National Industrial Symbiosis Program in the United Kingdom and industrial ecology activities in Denmark and Austria.

## MATERIAL SPECIFIC

**20. Assemble a package of incentives to encourage the organics cycle.** Organics remain a major component of the disposed waste stream from the business sector in Washington (estimated at 30%). It has also been identified as one of the priority waste streams in Ecology's Beyond Waste program, with a high potential for beneficial use. Accordingly, incentives to encourage commercial and industrial organics recycling have the potential for a high impact, particularly in the food manufacturing industry, supermarkets, restaurants, and institutions with large kitchen/cafeteria operations. The following incentives should be considered:

- Economic incentives may be needed to significantly impact the diversion of food waste. Some of the same financial incentives mentioned in other sections of this report, such as reduction or exemption from B&O tax (or a value-added tax if that were to occur) or state property tax, or tax-exempt bond financing could also be employed to encourage investment in food waste processing/composting technologies and facilities.
- Providing information and technical assistance. Since the economics of collection are based on the density of food-waste generation, it makes sense to focus primarily on the large generators: manufacturers, supermarkets, and restaurants. To help jump-start this effort, Ecology could help identify haulers and processors where large quantities of food wastes are generated by completing (or commissioning) a mapping study which characterizes and quantifies the sources of the waste.
- State procurement policies (e.g., for the WA Department of Transportation) specifying mulch and compost for roadside applications to their local counterparts. For example, it may be worth exploring the possibility of requiring localities receiving state transportation funds to adopt similar procurement policies.

## ADDITIONAL INCENTIVES SUGGESTED BY STAKEHOLDERS

The following incentives were suggested by stakeholders. Although they were not individually assessed by the consultant team, we include them here to document the range of ideas presented.

- Product or process labeling or certification. Efforts to label or certify environmentally-friendly products or, in some cases, processes have been effective at allowing consumers to make informed choices and drive market change. The most successful example is the third-party organic certification

system for organic food, now adopted by the federal government. Another extremely successful example is EPA's Energy Star label, which recognizes office machinery, appliances, and home electronics that require less energy and/or conserve energy better than comparably priced products. Both of these labeling programs have caused significant – even dramatic – change in how these goods are produced. We recommend that labeling be considered in certain instances with specific industries in Washington, perhaps as part of the “toolkit” advanced in Recommendation #5. However, we did not recommend it as a system-wide incentive due to the challenges in implementing a labeling program at the state level and the need for it to be highly targeted on certain environmental attributes and – in most cases – certain products.

- Create a “clean technology” or Beyond Waste mutual fund. One way to invest directly in Beyond Waste in Washington would be to create a mutual fund. Such a fund could hold only “clean technology” stocks, half of which could be companies based in – or with a significant presence in – Washington. Politically this option could have significant appeal, and we imagine a scenario where local business groups are lobbying the state pension fund to invest a portion of its portfolio in this fund. This option would align very well with a “clean technology” initiative still in discussion in the Puget Sound Prosperity Partnership. We did not pursue this option because of doubts expressed by a venture capital partner, but it may warrant further consideration in some other form.
- Other creative funding ideas. In addition to the mutual fund, other ideas advanced include: a Washington “clean tech” credit card, much like the current “Salmon Nation” credit card, for which profits could be invested in Washington clean technology companies; a tax on utility profits that goes to fund clean technology development; and an optional check box on utility bills that goes to fund R&D in clean technologies.
- “Top of the shelf” program from Japan. One stakeholder reported a program wherein the Japanese government would assess the energy efficiency of available products and then only purchase products in the top 25% of that product’s class.
- Liability coverage for recycling, especially for materials that include small amounts of toxic constituents.
- Tax increment financing
- B&O tax credit for product stewardship – cradle to cradle manufacturers responsibility
- \$20 ton B&O tax credit for recycled fiber use...
- Industry specific approach – include industry reps in planning



# Appendix B.

## Incentive Assessment Criteria

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The consultant team used four primary criteria for assessing the incentive options:

- **Effectiveness;**
- **Cost;**
- **Feasibility;** and
- **Equity.**

Following are more specific definitions of each criterion, including specific factors considered (but not individually rated) for each.

### EFFECTIVENESS

- Impact – To what extent is the incentive expected to achieve its intended environmental outcomes – design change, reduction, reuse, recycling, and secondary material flow – considering volume and/or toxicity as appropriate? In assessing effectiveness consider:
- Waste Reduction Hierarchy: To what extent is the incentive likely to achieve all forms of waste reduction – source reduction, reuse, and recycling?
- Systems Change: To what extent is the incentive likely to lead to system or supply chain wide change? Does the incentive overcome or neutralize an existing system-wide incentive or disincentive for virgin material consumption?
- Unintended consequences: What is the probability of unintended consequences within the materials system or on other systems (energy, air, water)? What is the chance that the policy will reduce waste but create a separate negative environmental consequence at the same time?
- Economic benefits – What economic benefits are expected from the incentive? Are jobs or businesses likely to be created or retained? How much economic benefit would accrue to Washington State?

### COST

- **Cost effectiveness** –How significant are the expected costs, relative to the expected impact?

### FEASIBILITY

- Political Feasibility – How likely will it be that the incentive will be supported politically and not be seriously threatened or weakened by political opposition from lobbyists, the public, or special interest groups? Is the incentive responsive to key stakeholder interests?

- Technical Feasibility – Does the expertise or technology exist to implement the incentive and is the degree of organization and coordination needed attainable? To what extent could the results and adoption of the incentive be measured for evaluation purposes?
- Legal/Regulatory feasibility – Can the incentive work given Washington State’s legal and regulatory authority?
- Leverage potential – Are there any national, state, or local initiatives or policy actions that are underway that could serve as “horses to ride” and increase the chances for the initiative to be successfully implemented? Are there existing effective programs elsewhere that could serve as models and that demonstrate success?

## **EQUITY**

- **Equity** – How equitable and fair is the incentive across business sizes and types, taking into account the “polluter pays” principle? Would certain businesses or communities pay a disproportionate share of the cost or receive a disproportionate share of the benefit? For example would small businesses pay a higher per-ton cost on their hazardous waste fees, or would they be less able to take advantage of an incentive because they aren’t big enough?

## Appendix C. Summary Incentive Ratings

INCENTIVES	Effectiveness	Cost-effectiveness	Feasibility	Equity	Overall
<b>Regulatory Responsiveness</b>					
1. Expand range of regulatory responsiveness incentives	2	2	4	3	3
1b. Create Environmental Results Program	3.5	3.5	3	4	3.5
2. Certify “green” practices or companies and reward these companies with streamlined permitting or other regulatory responsiveness	3	2	3	3	3
3. Increase recognition programs for businesses with strong environmental performance	1	3	5	4	3
<b>Market Based</b>					
4. Greenhouse Gas emissions cap & trade	4	4	2	5	3
5. Improve/expand Washington’s materials exchange programs	3	4	5	4	4
6. Resource management contracting	4	4	3	4	4
7. Product stewardship	4	4	2	5	3
<b>Financial</b>					
8. Offer a Resource Conservation Credit on the B&O tax	2	4	4	2	3
9. Fund R&D for Beyond Waste innovation	3	2	3	2	3
10. Offer “golden carrot” awards	3	2	3	3	3

<b>INCENTIVES</b>	<b>Effectiveness</b>	<b>Cost-effectiveness</b>	<b>Feasibility</b>	<b>Equity</b>	<b>Overall</b>
11. Restructure/expand the hazardous waste fees and taxes	5	5	3	5	5
12. Pursue tax shifts in conjunction with other ongoing tax policy discussions	4	4	1	4	2
13. Pursue combined output taxes and recycling subsidies (i.e., deposit/refund)	5	5	2	4	4
14. Expand the litter tax to fund targeted recycling and reuse programs	2	2	1	3	2
15. Institute a statewide solid waste tip fee surcharge.	2	4	3	4	4
<b>Mandates</b>					
16. Ban selected materials	5	3	4	4	4
<b>Liability/Assurance</b>					
17. Shift liability or financial assurance requirements	5	4	1	4	2
<b>Process &amp; Institutional Change</b>					
18. Adapt Ecology's administrative processes for incentives	3	4	3	4	4
19. Encourage existing industry innovation	3	3	4	4	4
<b>Material-Specific Incentive Packages</b>					
20. Assemble a package of incentives to encourage the organics cycle	5	4	3	4	3

# Appendix D.

## Summary of Stakeholder Perspectives

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This appendix presents some general lessons learned from stakeholders as well as specific comments on each of the twenty incentives analyzed.

### LIST OF STAKEHOLDERS AND EXPERTS INTERVIEWED

#### *Roundtable discussion organized by AWB*

Grant Nelson, AWB	Mark Greenberg, ACC
Dale Swanson, Panasonic	Bill Stauffacher, AF&PA
Brad Lovaas, WRRRA	Linda K. Dennis, Smedes & Associates
Lea Boyle, PSE	Dan Coyne, Coyne Jesernig
Paul Yount, Boeing	Frank Holmes, WSPA
Pete Hildebrandt, Alcoa / WSPA	Rick Slunaker, AGC
Cody Benson, Rabanco	Frank Warnke, Advocates Inc
Ken Johnson, Weyerhaeuser	Rich Garber, Boise
Kris Holm, Water Resources NW	Nathan Graves, Kennedy Jenks
Lori Evans	

#### *Individual interviews*

Gary Smith, Independent Business Association	Preston Horne-Brine, ReSourcesReSourcing Associates, WSRA
Pete Grogan, Weyerhaeuser	Jeff Gaisford, King County Solid Waste Division
Dan Silver	Bill Reed, King County Solid Waste Division
Ivan Miller, Puget Sound Regional Council, Prosperity Partnership	David Stitzhal, Northwest Product Stewardship Council
Brad Lovaas, WRRRA	Ben Packard, Starbucks
Grant Nelson, AWB	Bart Kale, NUCOR
Ken Lederman, Riddell Williams	Sue Ellen Mele, WCRC
KC Golden, Climate Solutions	Bob Gallagher, Pioneer Industries
Craig Lorch, Total Reclaim	Kyle McCleary, Duwamish Shipyards
Sego Jackson, Snohomish County Solid Waste	Rich Dean, Puget Sound Coatings
John Yeasting, ReSourcesReSourcing Associates	

Terry Seaman, Seidelhuber Ironworks  
Cinda Szurick, Gearworks  
Rich Simonson, LaFarge Cement  
Al Rainsberger, Todd Shipyards  
Jim Kethcum, Kimberly Clark  
Dave Bader, Environmental Health  
Services (Whatcom County consultant)

Ron Stuart, Simpson Kraft  
Tim Stearns, CTED  
Burton Hamner, Cleaner Production Inc.  
Terry Gillis, Recovery 1.  
Jeff Ketchell, LHWMP/IMEX

## OVERVIEW OF STAKEHOLDER PERSPECTIVES

In general, the 40+ stakeholders consulted for this report felt that focusing on incentives, rather than regulations, is a positive and acceptable approach, but most also remained skeptical and do not overwhelmingly support any one incentive recommendation.

Industry representatives were highly supportive of an incentives approach to achieving environmental goals but had varying opinions of the 20 incentive proposals presented to them. No one incentive achieved universal acclaim from all members of the business community interviewed for this project. Common perspectives of the business community include:

- An incentive approach is good, but incentives need to be targeted and customized to the needs of specific industries and their material flows.
- Before incentives are developed get a better understanding of the problem that is to be addressed with the incentive.
- Focus on specific wastes, materials, and industries. Start by identifying specific problems, and then devise incentives and other solutions to address those problems. Conduct smaller focus groups with specific industries representatives to devise workable incentives.
- Don't raise taxes or fees because 1) this will make Washington businesses less competitive; 2) funds often are not used for their intended purpose as revenues are diverted to the general fund; 3) the monies will be used to fund a bureaucracy; 4) the government already has enough money.
- Bans are not incentives – don't include mandates in the discussion of incentives.
- Incentives that have a great deal of paperwork associated with them will not function as incentives. Paperwork is a disincentive, particularly for smaller businesses.
- Build off of existing efforts and programs, such as the P2 planning program. Don't reinvent the wheel. There is lots of data generated as part of the pollution prevention planning process and there are many innovations that have resulted from these plans.
- Consider reducing liability and/or environmental requirements on recycling or reusing certain materials. Currently these materials are often landfilled, because the liability associated with recycling is too high. Provide assurances that businesses won't face liability claims associated with recycled materials.
- Don't treat businesses as villains! Most businesses want to do the right thing but the relationship with Ecology is set up to be very adversarial with Ecology (and other

agencies such as the Clean Air Authority) always looking for violations, even if they are minor.

- Recognition and education programs are good.
- The needs and interests of large and small businesses are different.
- Build incentives around performance based outcomes; ensure accountability.
- Enforcement will always be needed and is an important part of the mix.
- The best incentives for small businesses are cost savings – such as reducing material purchasing costs, reducing waste costs, reducing potential liability costs, reducing information gathering time.

Environmental and local government representatives were also interested in and supportive of an incentives approach to Beyond Waste. In general, those interviewed were supportive of the more aggressive options, such as tax policy changes and bans. They were also highly supportive of product stewardship. They were less supportive of options related to increased recognition and regulatory responsiveness. Many felt that recognition programs make everyone feel good but do not make much of a difference in terms of environmental benefits.

The consultant team frequently received unsolicited advice on how best to “frame” the incentives proposals with elected officials. This advice included the opinion that the time is “ripe” to pursue incentive policies and that incentives are in the “zone of interest” of the new Governor. Another recurring theme was that any new approach needed to have clear performance measures and accountability to receive support in the state legislature. Finally, the consultant team was advised by some about how difficult it is to achieve internal change at the Department of Ecology to pursue incentives and other new approaches. Several of those interviewed thought that a lack of staff resources and discretionary funds hampered the ability to implement incentives and that Ecology’s culture is not supportive of these types of approaches.

## **REGULATORY RESPONSIVENESS**

### **1. EXPAND RANGE OF REGULATORY RESPONSIVENESS INCENTIVES.**

#### **INDUSTRY RESPONSES**

- The biggest concern is permitting—both the time lag and the paperwork. “Regulators never help; they only penalize if it’s not done correctly. Their attitude is “read the rules, submit the permit and we’ll tell you if you got it right”. This is a problem; there should be collaboration in the permit application process to make sure it’s correct and complete and can be processed expeditiously”. Industry representatives also commented that most Ecology staff are less informed than the industry employees and are afraid of taking positions and/or giving information—maybe because of the liability concerns.
- “We are paying a LOT of money in permit fees AND doing all the work. We get nothing of value back from the regulators”.
- “More collaboration from regulators would be beneficial”.

- Paperwork has no value to an industry and takes a lot of time. Anything to reduce paperwork is a good thing. Fees are generally not high enough that a reduction offers any true incentive.
- Decreasing costs is always a good incentive but it needs to be done in a way that doesn't increase paperwork. Some "cost savings" require so much paperwork/justification that it isn't worth it. Many small companies do not have any staff to do paperwork; this falls on the owner.
- All of these incentives are a good idea but they'd have to be substantial in order to make a difference. A small cost savings or small decrease in time to get permits isn't enough of an incentive to change practices.
- "We are in the Environmental Performance Track program and I see VERY LITTLE benefit to the company."
- "Regulators don't understand economy of scale; if industry changes their practices it is always economically driven. Thus, cost incentives need to be large".
- "There are costs to compliance and perfect compliance should be rewarded".
- "Timeliness of regulatory response is the most important factor to consider".
- Focus by industry when communicating with small businesses. In the past, Ecology has had industry specific campaigns such as "shop sweep" for the auto repair industry. This worked extremely well and should be replicated and redone.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- Incentives can't be used to replace regulation or the existing "teeth" that require compliance. However, it is possible to use incentives to entice businesses to go beyond compliance.
- Fast track permitting is a good idea but may be difficult to implement (aren't they already going as fast as they can with available resources?) Tax incentives or waived fees may be more attainable (e.g. if you meet this higher standard you pay no fee).
- "Make sure that the incentives line up—it should cost businesses less to do the right thing and more if they don't. Current regulations don't always meet this simple standard."
- "Be careful with subsidies; over time when everyone meets the new standards subsidies are a detriment. It is better to use short-term tax credits or other mechanisms."
- Some local governments are skeptical to whether this will really make a difference.

## **2. CERTIFY “GREEN” PRACTICES OR COMPANIES AND REWARD THESE COMPANIES WITH STREAMLINED PERMITTING OR OTHER REGULATORY RESPONSIVENESS.**

### INDUSTRY RESPONSES

- Most industries did not see great value in this.
- “Maybe this would help in overseas/global markets but not in local markets. There are too many different requirements in a global marketplace”.
- One company doesn’t like LEED, stating that it is a paperwork nightmare that requires overkill in tracking each material. “LEED is a small-business killer”.
- “Benchmarking is not always fair or accurate. The devil is in the details on this”.

### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- There are concerns with self-certification; 3<sup>rd</sup> party certification may be okay.
- “LEED and E-PEAT are good models because there is a built-in benefit to participating (i.e. you will get more government sales). Non-action/participation is potentially harmful to a business”.
- “These programs are good if they are strong enough. Rewarding companies who go beyond minimum compliance with less regulatory burdens or fast-tracking is a good idea.”

## **3. INCREASE RECOGNITION PROGRAMS FOR BUSINESSES WITH STRONG ENVIRONMENTAL PERFORMANCE.**

### INDUSTRY RESPONSES

- Most industries strongly support more recognition programs.
- Some don’t think it makes much difference.
- If they sell products they are more interested in recognition than if they are a sub-contractor on a larger product (such as Boeing sub-contractors).
- Some thought this could be particularly helpful to LQGs.
- Some like the recognition to help with their relations with neighbors.
- “The State needs to involve businesses in the definition of “green industry”. Some of the standards are too short-sighted (e.g. require the use of different paint that needs to be reapplied much more frequently, resulting in more environmental damage than the original product)”.
- Increase recognition for good environmental performance in small ways as well as through formal recognition programs
- Publish success stories and best management practices in Ecology newsletters

## ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- King County (and others) are skeptical that recognition programs are worth the cost.
- “These can be a good companion to other programs; not enough as a stand-alone”.
- “These can be very useful, particularly for incremental change”.

## MARKET-BASED

### 4. GREENHOUSE GAS EMISSIONS CAP & TRADE

#### INDUSTRY RESPONSES

- Most industries have no opinion on this (because they do not have carbon-based emissions).

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “It is important to recognize the climate benefits of recycling”.
- “An important concept; not sure how it works as an incentive”.
- “If there were mandatory recycling goals there could be trading among industries to meet the goal (some could go higher in exchange for others to go lower)”.

### 5. IMPROVE/EXPAND WASHINGTON’S MATERIALS EXCHANGE PROGRAMS.

#### INDUSTRY RESPONSES

- Nearly all industries really like IMEX (though it’s rare they find a match). They like the idea of more proactive matching taking place. This option generally received enthusiastic support.
- Some are unsure how much of a difference this will make but it can’t hurt.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “This is worthwhile but it probably won’t be revolutionary”.
- “This is best if it is done at state level (rather than local)”.
- “This is better if done by a contractor than by a state employee”.
- “Good idea, but will the results really be worth the cost? I’m skeptical.”

### 6. RESOURCE MANAGEMENT CONTRACTING.

#### INDUSTRY RESPONSES

- Most industries would welcome assistance with ideas to reduce waste costs.

- Many are skeptical that the haulers could really provide this service in a meaningful way; “this may be an idea that only works in theory, not in the real world”.
- “Haulers would need to be proactive and approach the businesses; industries will not seek this out”.
- “Don’t underestimate the costs to a business in staff time to separate waste”.
- “Some feel this is going on already (e.g. Evergreen Recycling)”.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “Good concept, but it may take statutory changes. Maybe Cities could do this”.
- “The details are difficult to imagine; I’m skeptical.”
- “Haulers would need training; they don’t really “get” this concept”.
- “Savings may not be local. It is hard to imagine there being local cost savings large enough to provide adequate incentives. This is a low priority in terms of “bang for the buck.”
- “There may be a better entity than the haulers to do this”.

### **7. PRODUCT STEWARDSHIP.**

#### INDUSTRY RESPONSES

- Some companies want their products to be returned for reuse/recycling so they like this concept.
- Others are adamantly opposed on principle (though they like the concept better if they are thinking about getting rid of their computers rather than having Product Stewardship applied to their products/manufacturing). Some think the manufacturers are saddled with enough responsibility and that users/consumers need to share some the responsibility.
- Others support this in principle (particularly those that don’t manufacture a product).

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- All of those surveyed thought this concept is absolutely essential in future waste management and definitely needs to be included in this project. However, there are details that need to be worked out.
- “You need to put producer responsibility in place first and THEN the incentives for behavior change follow; Product Stewardship is not an “incentive” on its own”.
- “This option needs to be more specific—are you thinking about take back or design or both? Retail or manufacture, or both? Toxicity reductions or secondary materials use, or both? Products or packaging, or both?”
- “We have to move from the “end of the pipe” regulations of the 70s to the need for “end of product life” regulations in the 2000’s”.

- “This creates key incentives to recycle because the costs have been paid up-front.”

## **FINANCIAL**

### **8. OFFER A RESOURCE CONSERVATION CREDIT ON THE B&O TAX.**

#### INDUSTRY RESPONSES

- Industry respondents agreed that this is a good idea but they are skeptical that it would be large enough to really make a difference. The larger the business the more support there is for this—there may some economies of scale to consider.
- Industries speculate that this may be hard to administer. There are fears that the amount of paperwork required to justify the credit could easily exceed the value of the credit.
- All respondents agree that the B&O is a BAD tax.
- “This would only work if the credit is substantial”.
- “You must be sure this is given fairly. The businesses that are already doing all they can should get the credit—not just those who have been sloppy and thus can show large reductions in waste or increases in secondary materials purchases.”
- Provide tax credits for equipment for handling secondary materials.
- Providing a B&O tax credit for Beyond Waste would get the attention of finance department, potentially leading to an increase.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “Good concept, great idea.
- “Any tax reduction for doing the right think is a good idea.”
- “This should only be offered to those who go beyond minimum compliance.”
- “Details may complicate things; you need to talk to financial experts about this.”

### **9. FUND R&D FOR BEYOND WASTE INNOVATION.**

#### INDUSTRY RESPONSES

- Generally, industries felt this would be a good idea
- Some are skeptical of the actual benefits but don’t object to trying.
- Some would rather see a tax credit than “more government”
- One industry thought the combination of an ivory tower and bureaucrats can only lead to bad things.

## ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- All respondents voiced enthusiastic support for this idea.
- “This creates an incubator for innovation.”
- “This is similar to some of what the Clean Washington Center did, and is sorely needed.”
- “This addresses product design, which is absolutely key.”
- “You should consider modeling this after the recommendation in the Sustainable Washington Report to the Governor.”

## **10. OFFER “GOLDEN CARROT” AWARDS.**

### INDUSTRY RESPONSES

- Industries like this idea but nearly all of them said that a prize would not likely entice them to do something different than what they would already do. If their ongoing product or process development could merit a prize, they would enter the contest to get the money. Thus, the payback to the state could be very nominal (giving a prize for actions that would have occurred anyway).
- Some are opposed to using state money for this, but thought this could be a good incentive if it is private money.
- One company really liked this because they could offer the prize money to employees and use it as an incentive for employees to develop better ways to do their jobs.

## ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- Many respondents were skeptical.
- “How can government ‘give’ this money?”
- “This works well for enormous sums of money (e.g. 10-20 years ago, a multi-million dollar prize for a green refrigerator got lots of competition/innovation going).”
- “Industry should do this on their own. Citizens don’t like this kind of use of government money.”
- “R&D assistance is a much better idea.”

## **11. RESTRUCTURE/EXPAND THE HAZARDOUS WASTE FEES AND TAXES.**

### INDUSTRY RESPONSES

- Most industries are either skeptical about this or don’t know much about it (none of the persons interviewed were finance staff so many did not feel qualified to speak for the company on this).
- In general there was industry support for cleaning this up to remove the cap and review/improve the SIC codes.

- One person stressed that they like fees/taxes that are directly related to the costs associated with the problem; they don't really trust the efficiency of programs for "planning" or "education". They fear these are just ways to pay government salaries.
- There is a general concern that restructuring really means tax increases.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- "Cleaning up the inequities in these fees makes sense."
- "This is not much of an incentive, but is probably a good idea for other reasons."
- "Always be aware of the potential for illegal disposal when you raise fees for hazardous materials."
- "Users of hazardous substances should pay their own way; this is not an appropriate place for tax breaks."

## **12. PURSUE TAX SHIFTS COMPATIBLE WITH OTHER ONGOING TAX POLICY DISCUSSIONS.**

#### INDUSTRY RESPONSES

- Most industries are very skeptical about this.
- There is some distrust of how "sin" or "pollution" taxes would be identified. Industries want to be sure the white-hat industries are not considered in the same manner as the black-hat businesses (some white-hat businesses use toxics—they just minimize them and manage them much more responsibly).
- "This could drive some out of business."
- "You need to be sure the use of "sin" products or pollution is not driven by government specifications." (e.g. the WA State Ferries requires shipyards to use some toxic materials they would prefer not to purchase).
- "The first problem that should be addressed is inconsistent enforcement; environmental regulations are not necessarily enforced consistently from region to region throughout the state, which results in unfair competition. You need to level the playing field before you increase taxes or impose new taxes."
- Consider applying the tax increment financing concept to creating incentives

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- "This is a good idea; it is best to tax "bad" things."
- "Taxes should internalize the true cost of using a product—don't just impose random tax rates because products are bad. Have a financial rationale for the tax."
- "This is more of a "disincentive" but could be useful."

### **13. PURSUE COMBINED OUTPUT TAXES AND RECYCLING SUBSIDIES (I.E., DEPOSIT/REFUND).**

#### INDUSTRY RESPONSES

- “This needs to be very carefully crafted; tax shifts often benefit large companies and destroy small ones.”
- “Be careful about taxes on quantities; quantities generally go down when business is slow, not because companies have changed practices. These can be simply a tax on the size of the business.”

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “Everyone supports this but it’s difficult to do. Good luck!”
- “Be careful with subsidies; we are trying to get rid of many subsidies that have out-lived their usefulness (e.g. depletion allowances). It is preferable to create tax credits where the goal is to get everyone to that level (and thus paying the same). This is a better concept than subsidies.”
- “In general, it’s best to tax the bad and reward the good. This is a concept worth pursuing”.

### **14. EXPAND THE LITTER TAX TO FUND TARGETED RECYCLING AND REUSE PROGRAMS.**

#### INDUSTRY RESPONSES

- Most industry representatives had never heard about this tax.
- Most were skeptical about the link between grocery products and funding incentives programs.
- Some thought this sounded like as good of an idea as any for revenue generation.
- Some are opposed to raising taxes in general; some prefer penalties for violators rather than a general, across-the-board increase of any tax.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “This is probably a low-probability politically.”
- “The State does need to expand the products and increase the tax rate but it’s not really an incentive.”
- “This could be a good revenue source for the concept that all products should pay their own way, except organics (this concept is well-described in a paper by the Product Policy Institute).”
- “You will need to make a beneficial link with the retailers to make this work politically (e.g. additional funds should go toward tax credits for retailers who take

back products). Another example is to increase the tax on organics to fund commercial food composting programs.”

## **15. INSTITUTE A STATEWIDE SOLID WASTE TIP FEE SURCHARGE.**

### INDUSTRY RESPONSES

- Some industries would accept this, others are skeptical. Some just don't like new taxes; others want to know more about how the money would be used. If the money is used wisely most feel this is a reasonable to raise revenues.
- Before increasing taxes understand the taxes that already are imposed on disposal relative to recycling – approximately 17% according to one industry stakeholder

### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “You need to reshape this as collection fee or you won't collect it on out-of-state long haul waste.” “This could be combination of collection and disposal fees”.
- “This is a bad idea; taxing waste leads to less waste which (while a good outcome) results in less money for recycling programs. These programs need a sustainable revenue source where the programs gain by successes (not lose)”.
- “This is a great component to a number of funding sources.”
- “You need to go beyond MSW to include C&D, HW, etc.”

## **MANDATES**

### **16. BAN SELECTED MATERIALS.**

#### INDUSTRY RESPONSES

- Industry representatives felt strongly that there **MUST** be a viable alternative! For disposal bans there needs to be a thriving recycling industry with viable collection/transport options. For materials bans, there needs to be an alternative substitute before a ban is instituted.
- Product or material bans are effective in leveling the playing field and most industry representatives didn't object to them so long as there is a viable alternative and that it doesn't put them at a disadvantage when competing with out-of-state competitors.
- Most industries interviewed had positive comments about product bans—they are a clear, simple, fair way to regulate, and they maintain a level playing field.
- Illegal dumping is a concern; it is important that there are affordable collection/disposal alternatives and a plan for addressing cleanup of illegal dumping.
- Front-end product bans are perceived to be easier to implement (and more palatable) than disposal bans.

## ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- Respondents favored both product and disposal bans, so long as they are implemented correctly.
- Disposal bans work great when there is alternative collection in place; they may not be as effective in rural areas.
- Product bans are also very useful.
- “These are the most effective things you can do”.

## LIABILITY/ASSURANCE

### 17. SHIFT LIABILITY OR FINANCIAL ASSURANCE REQUIREMENTS

#### INDUSTRY RESPONSES

- Most could not really grasp the value of liability shifts. They did understand the value of the financial assurance option. The primary concern is cash-flow implications; these could be very detrimental to companies who operate on the margin (which seems to be most industries).
- Many stressed, however, that liability concerns are a key disincentive to recycling so they encourage the State to look more closely at this. Some industries stressed VERY strongly that they are very hesitant to recycle certain products because of concerns about future liability. For example, if there is a chemical in a waste (e.g. wood, ash, used paint, etc.) that is recycled and later the chemical is determined to be quite hazardous, there is huge liability because recycling has spread that chemical to a multitude of sites and the industry who disposed of the waste is responsible for clean-up of all those sites. If the product is disposed (rather than recycled) it goes to one site so liability is contained.
- Some did not feel this is necessary; there are already enough disincentives for a spill.
- “Liability should be on the party who specs the product, not the company who uses it in response to that specification.”

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “Financial assurance is attractive because it expresses the costs and risks, and provides incentives to reduce reliance on toxics. This is a good market signal. Liability changes are trickier; need more information.”
- “If there is a “bad” product in the marketplace (e.g. mercury or lead), have a formula for each gram of the chemical bought or sold, and require a dollar amount to be deposited into an account for financial assurance”.
- “This is very close to producer responsibility which is a good idea”.

# PROCESS AND INSTITUTIONAL CHANGES

## 18. ADAPT ECOLOGY'S ADMINISTRATIVE PROCESSES FOR INCENTIVES.

### INDUSTRY RESPONSES

- Industry representatives agreed that there needs to be a balance between incentives and penalties; neither works without the other.
- Industries also agreed that the goal of regulators should be help companies meet/exceed compliance—not to merely punish mistakes. Regulators should clearly communicate what needs to be done and give industries a chance to fix it—then penalize; don't issue penalties for the first offense.
- “Partnership is a better model than command and control, but you need some standards/enforcement to keep the playing field level.”
- “Inform and educate should be top priority; penalties for minor violations (particularly paperwork mistakes that don't result in any toxic outputs) should be rare.”
- “It is important to make sure nothing you do interferes with ability to compete globally; we do not work in a state-wide market.”
- “The goal of regulators should be to support/encourage good practices, NOT to slam the industry.”
- “Decreasing reporting obligations/paperwork requirements is key.”

### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “Having incentives as a compliment to Command and Control regulations is a good idea, but you need a backdrop of regulations with strong teeth for this to be effective.
- “Don't get rid of C&C; key is to do C&C correctly. Incentives to get businesses to go beyond minimum compliance is a very good idea.”
- It is a good idea to involve business in rule-making, but this should be an in-put process, not a consensus process.”

## 19. ENCOURAGE EXISTING INDUSTRY INNOVATION.

### INDUSTRY RESPONSES

- Most industries liked this idea.
- Some were a little suspect of how big a difference it would make.
- Some industries will be reluctant to publicize waste flows, particularly to the public, so waste mapping should be voluntary.
- Some companies have very specific specifications for materials they can use; they thus prefer to do brokering in-house and probably wouldn't use this.

## ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “This is a good idea”.
- “The state should bring back the Clean Washington Center. This is one of many functions the CWC offered that was very valuable”.
- Some interviewed were skeptical; this could potentially be a lot of work for little in return.
- “If publication is linked to a business journal that industries already read regularly it may work, but a new publication may not be effective.”
- “What are the impediments for industry to do this on their own (through trade associations)? This is a good idea but only as a small component of a larger package; it does not offer much on its own.”

## MATERIAL-SPECIFIC INCENTIVE PACKAGES

### 20. ASSEMBLE A PACKAGE OF INCENTIVES TO ENCOURAGE THE ORGANICS CYCLE

#### INDUSTRY RESPONSES

- Liability is key.
- “We don’t want to offer materials for compost until/unless we are sure there will be no future liability (which can occur with a future rule change—we may use some substance now that no one knows is a problem but if it’s composted we could be liable for areas all over the state that used the compost; at least if it’s disposed we know our liability is limited to one disposal site)”.

#### ENVIRONMENTAL/LOCAL GOVERNMENT RESPONSES

- “This is a large component of the waste stream so it’s good to focus on organics.”
- “Procurement can always improve.”
- “Give tax breaks to businesses that are doing the right thing and lure more businesses to follow their lead.”

## OTHER IDEAS AND COMMENTS

- Convenience is key; industries will recycle anything if someone picks it up (and there are no liability concerns).
- The Puget Sound Clean Air Agency is the largest source of grief (this was stated from a number of industries). It is perceived that they work hard to find violations and impose penalties to keep their agency revenue flowing.
- Consider providing incentives for the use of renewable resources, such as wood products and fiber, not just secondary materials.

- The TREE – Toxics Reduction and Environmental Efficiency – Program is a example of a model effort that should be replicated and expanded by Ecology.
- Small businesses generally lack the information or knowledge about proper management to protect against environmental releases. Once informed they generally do extremely well. Focused education must be part of any small business incentive program. Incentives for participating in education include tax savings, disposal cost savings, liability reductions, public promotions.
- Make sure that the current waste and material collection system continues, providing security and a high level of reliability.
- Make sure that materials that are collected for recycling are actually recycled and that the systems or incentives for secondary material use are not abused.
- Provide incentives for environmental management systems that are certified or certifiable.
- Focus on providing assistance to businesses to achieve Beyond Waste. Be hyper-active in providing market and technical assistance to businesses. Have Ecology serve as a high level technical resource that businesses can have confidence in.
- Change regulations to allow for the combustion of wastes that are currently being landfilled and could be used as an energy source with no adverse impact on air quality. (WAC 173.434)
- Focus on eliminating existing disincentives, such as the rules regulating spent pot lining
- Education is important; inspectors need to learn to explain “why” and “how”, not just penalize.
- Regulators need to put the issue in the larger context so that industries understand why all the effort is important (e.g. talk about fish and rivers and the impact of toxic releases).
- Financial incentives always sound good but rarely make a difference—they need to be substantial to put a dent in the costs of doing business. What is really needed is more assistance and less paperwork.
- ECOSS is a good example of how to help businesses. Regulators should use this model.
- Use common sense in rules; for example, don’t regulate a cement plant that burns ash as an “incinerator”—this provides a disincentive to recycle. Also, the goal of new regulations should be to get the best rule possible written and the process should be flexible enough to allow industries to participate in a meaningful manner, even if it means extending deadlines and proactively seeking industry input.
- There are a number of existing regulations that hamper product stewardship (e.g. classifying retailers who accept used products as a “recycler”). These need to be corrected.
- There is still a real need for an entity like the Clean Washington Center to work directly with businesses to find markets, change processes, etc.

- The State should consider a “Top Shelf Policy” similar to a program in Japan. In Japan, the Government announces it will only buy the top x% (e.g. 25%) of materials with recycled content (or any other standard). Only the companies that are producing products in the top 25% receive government contracts. In x number of years, this is put out to bid again, and thus there is incentive for competitors to use MORE recycled content and thus get into the top 25%. The state keeps raising bar through purchasing while relying on existing technologies. It is a simple way to provide a very substantial incentive.
- Consider mandatory recycling goals like California. Washington could also use an agency like the California Integrated Waste Management Board (CIWMB).
- KC LHWMP program gives very small grants to businesses that will change their processes to reduce toxics use/waste. This could be modeled on a larger scale.
- Create more 3<sup>rd</sup> party industry-based organizations by sector (e.g. autos, electronics, etc.) and review existing regulations /policies with them to see where the incentives and disincentives are.
- The product stewardship model needs to be better integrated into these options.
- A PAID commission of industry experts should be established. Pick key leaders (high level executives) to serve in a paid position (not advisory or voluntary). For example, offer \$10,000 each to ten executives along with a clear job assignment and deliverable. These executives could offer more for that \$100,000 investment than a lot of consulting contracts.
- These options need more work; nothing on this list really inspires enthusiasm.
- There should be a stronger procurement option in this package.
- The highest priorities should be R&D, Producer Responsibility, and bans.



# **Appendix E.**

## **Lessons from Environmental Economics**

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This document contains seven short papers, listed below with their corresponding page numbers. All of these papers were written by Margaret Walls of Resources for the Future.:

<b>Microeconomics and Environmental Externalities .....</b>	<b>84</b>
<b>Environmental Policies Part I: Emissions and Waste Taxes.....</b>	<b>87</b>
<b>Environmental Policies Part II: Tradeable Permits .....</b>	<b>90</b>
<b>Environmental Policies Part III: Taxes and Tradeable Permits in a Second-Best Setting.....</b>	<b>93</b>
<b>Environmental Policies Part IV: Liability and Financial Assurance Requirements</b>	<b>95</b>
<b>Environmental Policies and Equity.....</b>	<b>99</b>
<b>Policies for Waste Disposal and Related Externalities.....</b>	<b>101</b>

# MICROECONOMICS AND ENVIRONMENTAL EXTERNALITIES

## **I. Introduction**

In order to understand economists' analyses of environmental policies, it is first necessary to be clear about the paradigm under which these analyses are conducted, as well as the language of economics. We begin here by first describing microeconomic models in general, define externalities, and discuss social optimality in the context of this framework.

## **II. Basic Assumptions of Economic Models**

It is important to understand the conceptual paradigm that forms the basis for nearly all work in economics. All studies that we will review assume that the economy consists of utility-maximizing consumers and profit-maximizing producers. Thus, consumers choose which products to consume and how much of each to consume so as to maximize their own utility, or well-being, subject to an income constraint and subject to prices that they face in the marketplace (and generally, are unable to influence). Producers choose how much output to produce and how much of inputs such as materials, labor, capital, and energy, to purchase. In many studies, producers are assumed to operate in competitive markets and thus are price-takers in both input and product markets. Some models include raw material suppliers, retailers, and recyclers. For all kinds of businesses, however, the profit-maximization hypothesis still holds.

Although some of these assumptions may seem restrictive, or at least unrealistic when compared with the real world, they are generally satisfactory for purposes to which the models are applied – assessing the direction and relative magnitudes of the impacts of particular changes in market conditions, including policy changes. For example, a government policy that raises the price of a particular input – say, a tax on a raw material or energy – would lead a producer to shift its mix of input use away from the higher-priced input toward lower-priced ones, produce less output, and charge a higher price for its product to cover the increased costs of production. Altering the assumption in the model about the market structure in which the firm operates would not change the direction of these effects. The higher product price would lead consumers to change their purchasing behavior and buy less of the higher priced good. Consumers may not consciously consider the impact on their utility when making these decisions but limited budgets and rationality generally lead to such outcomes. Similarly, *all* producers and consumers may not behave in exactly this way but on average, these results will hold.

## **III. Externalities and Social Welfare**

Much of the field of environmental economics addresses the issue of externalities, side-effects of production and consumption that are not considered by the decision-maker but that impact the utility of consumers or production possibilities of other firms. Published studies abound that analyze, from a theoretical or empirical standpoint, the most efficient or cost-effective way to internalize these externalities. In economists' parlance, an efficient outcome is one in which the overall welfare of society is maximized – i.e., inputs are used and output is produced and consumed such that the

maximum possible value of so-called producer and consumer surplus is achieved. In the absence of any externalities, competitive markets will naturally generate this efficient outcome. With externalities, the government can design policies to internalize the externalities and still achieve an efficient outcome. Much of the environmental economics literature deals with this policy design question – what specific policy tool will provide the right incentives to producers and consumers to generate the efficient outcome and how does one policy tool compare with another? Some studies rely on what are called “partial equilibrium” models, models that deal with one industry or product or material in isolation, while others use a general equilibrium approach where all markets must simultaneously clear and impacts of prices and policies across markets are explicitly modeled. Obviously, the real world is a general equilibrium one; however, if cross-market effects are not large relative to the direct effect of a policy, then the simpler partial equilibrium framework is often a reasonable approach.

In some of the theoretical work in environmental economics and much of the empirical work, economists may focus on the cost-effectiveness of policies instead of efficiency. A policy instrument is cost-effective if it achieves a given reduction in an externality at the lowest possible cost to society. All efficient policies are cost-effective but not all cost-effective policies are efficient (Baumol and Oates, 1988).

A couple of final points should be made about externalities. There is a strand of the environmental economics literature that emphasizes materials balance conditions and the determination of residuals from production and consumption in a general equilibrium setting. Much of the early work that pioneered the entire field of environmental economics, undertaken by Allen Kneese and colleagues at Resources for the Future in the 1960s and early 1970s, heavily emphasized materials balance conditions and how those conditions fit into a general equilibrium model of production and consumption.<sup>23</sup> The seminal paper by Ayres and Kneese (1969) argued that because residuals are an inevitable byproduct of consumption and production activities, externalities are ubiquitous in society.<sup>24</sup> Residuals are inevitable because of the first law of thermodynamics, or the conservation of energy – matter cannot be created or destroyed, it can only change forms. Many subsequent studies pointed out, however, that not all residuals are externalities because not all residuals impose damages (Noll and Trijonis, 1971). This is a key point to emphasize: the focus of economists is on securing a socially optimal outcome, including the efficient level of any waste or pollution. There will always be waste; the goal of government policy is to reduce that waste below free market levels but only to the point where overall social welfare is maximized.

The early literature is instructive because it highlights the physical and economic inter-relationships that exist in markets and some of the more recent models focusing on waste policies lie in this tradition. In other words, they explicitly incorporate materials balance constraints in their models. However, models that deal with air and water

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<sup>23</sup>Studies that took this approach include the classic paper by Ayres and Kneese (1969), as well as Kneese, Ayres, and d’Arge (1970), Kneese (1971), Spofford (1971), Russell and Spofford (1972), and Kneese and Bower (1979).

<sup>24</sup> At the time, such an argument was a marked contrast to the predominant view in the economics profession that externalities were only occasional deviations from market perfection. The focus in the economics literature at that time was more on property rights solutions to one-on-one externalities rather than government intervention to address externalities that affected a large number of people (Coase, 1960; Buchanan and Tullock, 1962). See Weinberg and Newbold (2003) for an interesting discussion of the Kneese et al. work vis-à-vis other approaches to environmental externalities.

pollution are less likely to emphasize the materials balance concerns on which Kneese and his colleagues focused their attention. This is not necessarily a problem in terms of the policy conclusions from those studies, but it is something to keep in mind. If multiple environmental impacts are an important concern of policymakers, the materials balance, general equilibrium framework might be preferred. In addition, if the policy prescription for a particular air pollution problem leads to large increases in water effluent or solid waste by-products that cause damages of their own, this problem needs to be acknowledged and addressed.

# ENVIRONMENTAL POLICIES PART I: EMISSIONS AND WASTE TAXES

## I. Introduction

Assessing a per-unit tax or fee on waste or emissions has many desirable incentive properties. We begin with a discussion of the basic Pigovian emissions tax and then discuss its application in the waste area with “pay-as-you-throw” pricing. We follow with a brief discussion of existing environmental taxes in the U.S. and Europe.

## II. Pigovian Taxes

Decades ago, economist A.C. Pigou (1932) proposed levying a tax per unit of emissions, paid by each polluter on all units, and set at a rate equal to the marginal social costs of that pollution at the social optimum. As explained above, the social optimum is the level of pollution where the extra benefit to society from eliminating another unit of the pollutant is exactly equal to the extra cost. It is important to understand that a true Pigovian tax is levied on *pollution*, not on some related good such as output, and it is set at the marginal social cost *at the social optimum*, not at some other arbitrary level where the marginal social cost may be higher or lower.<sup>25</sup>

A Pigovian emissions tax has several desirable incentive properties. Because it directly targets emissions, it should lead a polluter to do everything in its power to reduce emissions. Instead of picking a winner by mandating a particular pollution control technology or by taxing output or an input related to pollution, it allows the polluter – the one with the best information about its production technology, inputs, costs, and other factors – to make the best choice for itself. In doing so, it should lead to pollution reduction at the lowest possible cost. In addition, it provides a financial incentive for the polluter to develop new and better ways of controlling pollution since the firm gains a competitive advantage by doing so. Economists generally refer to this feature of an emissions tax as “dynamic efficiency.” As a “stick” rather than a “carrot”, the tax also provides the right incentives for industry size; a subsidy instead of a tax would increase profits in the industry and encourage more firms to enter, thus offsetting any pollution reduction benefits that the subsidy might provide (Spulber, 1987?).<sup>26</sup>

Knowing the social optimum and thus setting a true *Pigovian* emissions tax is difficult. Nonetheless, economists often focus on taxes per unit of emissions or waste, regardless of the level at which they are set, because they provide important incentives for reducing the externality in question. It is essential to understand, however, that the purpose of such taxes is to provide incentives for producers and consumers to change behavior, not to raise revenue to fund a particular government program. The use of the revenues generated from the tax can be, and should be, separated from discussion of

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<sup>25</sup> Key studies in economics that developed the emissions tax idea are Baumol (1972), Baumol and Oates (1988), and Plott (1966).

<sup>26</sup> This is an important issue that we will return to later in our discussions. Because policymakers often do not want to dampen economic growth nor lose favor with particular industries, they often turn to incentives such as tax credits or other kinds of subsidies rather than fees or taxes. The recently introduced federal legislation by Senators Wyden (D-OR) and Talent (R-MO) to encourage electronics recycling, “The Electronic Waste Recycling Promotion and Consumer Protection Act,” is a case in point. It calls for an income tax credit for firms and consumers who recycle computers and monitors (see [http://wyden.senate.gov/media/2005/03032005\\_ewaste.html](http://wyden.senate.gov/media/2005/03032005_ewaste.html)).

the ideal tax structure and rate. This point was established early on in the economics literature on this topic (see Baumol and Oates, 1988). Unfortunately, this point is often muddled in policy discussions; for example, alcohol, cigarette, and gasoline taxes are sometimes raised by state governments to increase revenues for a variety of programs. If these taxes spur people to change their behavior, they will not be a reliable source of revenues for the government since tax revenues will fall as consumption of these products falls. Many discussions of environmental taxes and fees center on their ability to raise specific sums of money and this is missing the primary virtue of such instruments.<sup>27</sup>

Although an emissions tax in theory has many desirable properties, it may have some problems in practice. Most important may be the difficulty associated with measuring and monitoring emissions. For some types of pollution, this problem is gradually being overcome by new and better monitoring technologies, but in many cases the problem remains.<sup>28</sup> In the case of solid and hazardous waste reduction, a Pigovian tax may have some additional problems. By making legal disposal more expensive, it might encourage illegal disposal. To the extent that this is easy to do and the likelihood of getting caught is small, consumers and others subject to the tax may turn to this form of disposal and create an additional, in some cases more serious, externality.

Many communities in recent years have begun charging a fee per bag or container for residential trash collection and disposal. This form of pricing, variously known as “pay-as-you-throw” (PAYT), unit-based pricing, or variable rate pricing, might not be a Pigovian tax – i.e., it might not be set equal to the marginal social cost of waste disposal – but it is a form of “emissions” tax. In fact, in the absence of such pricing or an equivalent policy instrument, it can be shown that trash generation is greater than is optimal. If the fee is not set too high, dumping is probably not a serious problem in most communities. In this case, it is worth knowing what the empirical evidence is on the efficacy of PAYT. We briefly review those studies in the next section.

### **III. Pay-As-You-Throw**

Existing PAYT studies have used either household or community-level data on waste and recycling volumes to econometrically estimate the impact that PAYT has on trash volumes and recycling. Jenkins (1993) estimated a model of waste and recycling and found that an \$0.80 per 32-gallon container charge would reduce waste by 9.5% without a curbside recycling program and 14% with a curbside program. This reduction corresponds to a point elasticity of demand for garbage of  $-0.12$ , quite inelastic. Fullerton and Kinnaman (1996), analyzing the same \$0.80 charge applied in the town of Charlottesville, Virginia, which had a curbside recycling program, also found that households reduced their waste by 14%. This corresponds to an elasticity of demand of  $-0.075$ , even more inelastic than Jenkins’ estimate. Kinnaman and Fullerton (2000) use national community-level data on waste and recycling to econometrically estimate a model that controls for endogenous local policy – i.e., the model jointly estimates communities’ decisions whether to offer curbside recycling and/or PAYT along with the

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<sup>27</sup> The EPA “Guidebook of Financial Tools” is particularly guilty of this confusion (U.S. EPA, 1999). In addition, the National Electronic Product Stewardship Initiative (NEPSI) debates often centered around the issue of whom should pay for collection and recycling programs rather than how incentives should be structured to reduce e-waste (see [www.nepsi.org](http://www.nepsi.org) and document therein).

<sup>28</sup> Vehicle emissions and mileage are an example where monitoring is difficult but the technologies are advancing. In the U.K., plans are underway to retrofit vehicles with a satellite tracking system in order to institute a mileage-based pricing system for road use (see Tempest, 2005).

trash and recycling demand curves. The authors' estimated elasticity of demand for trash varies depending on where on the demand curve it is evaluated but an estimate suitable for comparison with other studies is  $-0.28$ . Podolsky and Spiegel (1998) obtain an even higher (in absolute value) elasticity of  $-0.48$ , again using cross-community data.

Most of these studies also look at the impact that PAYT has on recycling volumes. For the most part, PAYT increases recycling but the reduction in waste from introduction of PAYT is greater than the increase in recycling. This suggests that households are reducing consumption in response to the fee and/or finding other means of getting rid of their trash, including possibly illegal dumping. Most of the studies are unable to say whether dumping is occurring or not. However, a study of weight-based pricing in the Netherlands finds little evidence of dumping (Linderhof et al., 2001).

#### **IV. Other Examples of Emissions Taxes**

In the U.S., there are not many other examples of true emissions taxes. There are many environmental taxes – the gasoline tax, fees on chemical sales used to fund the Superfund program, fees on tires, batteries, and motor oil, to name just a few – but they are not taxes levied directly on the externality-generating activity but are rather levied on some related good. In other words, it is not motor oil or battery production and sales per se that create the environmental problem but rather the waste disposal (in some cases illegal disposal) at end of product life.<sup>29</sup>

In Europe, there are a few examples of emissions taxes. The Netherlands has a system of effluent fees for industrial water pollution. These fees came into being with the Surface Water Pollution Act of 1970 and have increased over time. They were originally devised as a means of raising revenues to finance sewage treatment plants but because they vary with the level of organics and heavy metals in industrial effluent, they have provided incentives for industrial sources to cut back on pollution. Bressers and Lulofs (2004) find evidence to suggest that the fees have been a cost-effective approach to reducing industrial water pollution and that firms have found innovative ways of reducing pollution. Millock and Sterner (2004) report that there are established NOx emissions tax systems for industrial and power plant sources in Sweden and France and fledgling systems in Italy, Spain, and a few Eastern European countries. Because there are many different ways in which NOx can be reduced – fuel-switching, exhaust gas recirculation, and changes in ways that the combustion chamber operates – a flexible, economic incentive-based approach such as an emissions tax is particularly cost-effective for NOx. Millock and Sterner state that Sweden's tax is \$3,000 per ton and has led to dramatic reductions in emissions; Sweden's NOx emissions are reportedly quite low by international standards. The French tax is much lower than Sweden's and also only applies above a cutoff level of emissions so is less effective.

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<sup>29</sup> There may also be production-related externalities associated with these products such as air and water pollution but again, the product itself is not the externality. The activity that should be taxed is the pollution or waste disposal. and mileage are an example where monitoring is difficult but the technologies are advancing. In the U.K., plans are underway to retrofit See Boyd et al. (2002) for examples of trading programs across it vehicles with a range of environmental problems. satellite tracking system in order to institute a mileage-based pricing system f<sup>31</sup> Initially, the industries participating are production and processing of iron and steel, minerals (such as cement, glass, or ceramic production), energy (such as electric power and direct emissions from oil refineries), and pulp and paper. or road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985), it vehicles with a satellite tracking system in order to institute a mileage-based pricing system for road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985),<sup>32</sup> For a description of the sy and Baumol and Oates (1988). stem and analysis of the potential problems remaining to be worked out, see Kruger and Pizer (2004).

# ENVIRONMENTAL POLICIES PART II: TRADEABLE PERMITS

## I. Introduction

One reads many references in the popular press and elsewhere to “market-based” approaches to environmental policy. In many cases, this is interpreted to mean *no* policy – i.e., leaving environmental problems to the free market. What the term, in fact, should be understood to mean is *creation* of a new market – a market in pollution. Pollution and waste problems are inherently problems of missing markets; because emissions into the air or waterways or disposal onto land is free, firms and others have an incentive to overuse those resources.

In recognition of these missing markets problems, economists developed the concept of creating a market for pollution rights and allowing polluters to trade those rights. In theory, tradeable permits have been shown to be equivalent to Pigovian taxes.<sup>30</sup> We discuss such systems here.

## II. Cap-and-Trade Emissions Permit Systems

In an emissions permit system, a total cap is established on industry emissions of a particular pollutant and rights are distributed to individual firms in the industry such that the total number of rights equals the total amount of pollution allowed. Firms are then permitted to trade those rights among themselves. If firms differ in their costs of pollution control, then those firms with lower costs can be expected to sell allowances to firms for whom costs are higher. Total pollution remains the same but firms with higher costs pollute more and those with lower costs pollute less, thus the overall target is met at the lowest possible cost. Like an emissions tax, tradeable permits also spur firms to find cheaper ways of reducing pollution (Newell and Stavins, 2003).

The largest experiment with tradeable permits, to date, has been the sulfur dioxide (SO<sub>2</sub>) allowance trading program set up in the 1990 Clean Air Act Amendments. In that program, electric utilities are subject to a total cap on SO<sub>2</sub> emissions and are allocated rights which they can trade with one another. The SO<sub>2</sub> allowance program is widely regarded as an enormous success. During the first 5 years, emissions from regulated sources were roughly 40% below the regulated caps on these generating units as firms took advantage of the flexibility to bank unused emission allowances from early years for use in later years. (U.S. EPA 2002) Analysis has shown that trading led to cost savings of between 30 and 50% of what costs would have been under a more prescriptive approach to SO<sub>2</sub> regulation (Ellerman et. al. 2000; Carlson et al. 2000). Costs under the program have also turned out to be much lower than expected. Early

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See Boyd et al. (2002) for examples of trading programs across it vehicles with a range of environmental problems. satellite tracking system in order to institute a mileage-based pricing system<sup>31</sup> Initially, the industries participating are production and processing of iron and steel, minerals (such as cement, glass, or ceramic production), energy (such as electric power and direct emissions from oil refineries), and pulp and paper. or road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985), it vehicles with a satellite tracking system in order to institute a mileage-based pricing system for road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985),<sup>32</sup> For a description of the sy and Baumol and Oates (1988).stem and analysis of the potential problems remaining to be worked out, see Kruger and Pizer (2004).

estimates made at the time that Title IV passed set the long-run marginal cost of controlling SO<sub>2</sub> – i.e., the cost after the program is fully implemented -- at between \$580 and \$760 (in 1995 dollars) per ton (ICF 1990). In a recent study, Carlson et al. (2000) estimate that the allowance price, and thus the marginal cost, when the program is fully implemented would be only \$291/ton (in 1995 dollars), well below initial predictions.

In the European Union, a greenhouse gas emissions trading program is set to begin later this year that will dwarf the size of the U.S. SO<sub>2</sub> program. The objective of the program is to meet the goals of the Kyoto Protocol and while the design of the system is quite complicated and many aspects of it remain to be worked out, the basic system is a classic cap-and-trade system and it applies across all the member countries. Under the plan, each EU member state has an overall target for its national emissions under the EU burden sharing agreement associated with the Kyoto Protocol. A portion of this national target must be assigned to the installations participating in the system with the remainder of the national target available for emissions outside the system.<sup>31</sup> Each country must establish a National Allocation Plan listing participating installations and their allocations, as well as a long list of other information and projections of future emissions. This is a daunting task and is only part-way toward making the system work. Most analysts believe there is a great deal of uncertainty facing participants in the system.<sup>32</sup>

### **III. Tradeable Credits**

The tradeable permit idea has not been applied to a great extent to waste problems. However, a variant of tradeable permits known as tradeable credits has received some attention as a way to promote recycling and DfE. In concept, a tradeable credit system could work as follows: producers in an industry would be subject to a recycling rate standard; to meet the standard, producers could collect and recycle their products themselves or they could pay a recycler to do it or they could purchase credits from others who have recycled more than their own obligation. Recyclers would be required to keep track of what they recycled by brand. At the end of the year, producers would have to show that they had met the recycling target or hold enough credits purchased from others to comply with the target (Palmer and Walls, 2002; Salmons). The virtue of such a system is that it spurs producers to make their products more recyclable in order to meet the mandate at lower cost, thus it provides DfE incentives. Moreover, because it is an economic incentive-based approach, it should have the potential to meet the standard at the lowest possible cost. Unfortunately, though, because it targets recycling and not waste flows directly, it would not be an efficient policy for reducing waste unless it were combined with a disposal fee or product tax.

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<sup>31</sup> Initially, the industries participating are production and processing of iron and steel, minerals (such as cement, glass, or ceramic production), energy (such as electric power and direct emissions from oil refineries), and pulp and paper. or road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985),it vehicles with a satellite tracking system in order to institute a mileage-based pricing system for road use (see Tempest, 2005)ntgomery (1972), Tietenberg (1974; 1985),<sup>32</sup> For a description of the sy and Baumol and Oates (1988).stem and analysis of the potential problems remaining to be worked out, see Kruger and Pizer (2004).

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A type of tradeable credit system is used in the U.K.'s packaging extended producer responsibility (EPR) program. The U.K. system operates somewhat differently from this conceptual approach and as a result has far less of an impact on product design. In the U.K., so-called "compliance schemes" that take collective responsibility for recycling the packaging of a number of producers generate the credits and credits are traded among compliance schemes and producers. Because packaging is not sorted by brand, which would be prohibitively costly in any case, there is no direct incentive for producers to make their packaging more recyclable.

One other real-world example of a tradeable credit approach is a renewable energy portfolio standard that electricity producers must meet. Since the mid 1990s, fourteen states in the U.S. have imposed renewable generation requirements on electricity retailers or generators within their borders. Typically referred to as a renewable portfolio standard or RPS, these requirements set a minimum level or percentage of electricity sales that must come from renewable generation by a particular date. In several states, including Connecticut, Nevada, New Jersey, New Mexico, Texas, and Wisconsin, the implementing law or regulation also allows for trading of renewable energy credits or certificates to meet this requirement.<sup>33</sup> Typically, these trading programs work as follows. Renewable energy certificates are created whenever an eligible renewable generator generates a mega-watt hour of electricity. These certificates can then be sold together with the energy generated by these facilities or sold separately. Thus, an electricity retailer can meet its renewable obligation by generating renewable energy itself and keeping the associated credits, purchasing renewable energy bundled with credits from others or by purchasing renewable energy credits sold separately.

Renewables mandates are also becoming more popular in Europe. The European Union issued a Renewables Directive in October of 2001 that requires member states to adopt national targets for renewables consistent with reaching the overall EU target that 12 percent of total energy and 22 percent of all electricity come from renewables by 2010. The U.K. is implementing a tradeable credit scheme to help in achieving its goal, and other European countries including the Netherlands, Belgium and Italy are also in the process of implementing tradeable credit schemes.

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<sup>33</sup> For more details on state RPS policies see Union of Concerned Scientists web site at <http://www.ucsusa.org/publication.cfm?publicationID=68>.

# ENVIRONMENTAL POLICIES PART III: TAXES AND TRADEABLE PERMITS IN A SECOND-BEST SETTING

## I. Introduction

The early literature in environmental economics on policy instrument design ignored, for the most part, any pre-existing distortions in the economy such as taxes on labor and capital. In the jargon of economics, a setting with such distortions gives rise to a search for “second-best” policies. Second-best considerations are nothing new in economics but research into the role they play in environmental policy design has uncovered some interesting findings in recent years.

## II. Optimal Environmental Policies with Pre-existing Distortionary Taxes

In the early 1990s, a few authors suggested that there might be a so-called “double dividend” from pollution and waste taxes. Pearce (1991), Repetto et al. (1992), and Oates (1993) suggested that the revenues generated from environmental taxes could be used to reduce distortionary taxes already in existence and thus improve the environment and reduce the deadweight loss of the tax system at the same time.

It wasn't long before more careful analysis showed this argument to be flawed, or at least incomplete. Subsequent studies showed that a pollution tax interacts with pre-existing labor and other taxes in complicated ways and the overall welfare effects depend on several key factors (Bovenberg and de Mooij, 1994; Parry, 1995). These studies showed that there are three distinct welfare effects of an environmental tax: the direct welfare gain associated with improving the environment (which would be the end of the story in the traditional first-best analysis); the “revenue-recycling” effect, which also is a welfare gain because of reductions in the rate of distortionary taxes; and the “tax-interaction” effect. This last effect arises because the environmental tax raises the prices of goods and services in the economy and thus reduces the real wage, lowering work effort. The net effect of the environmental tax on welfare thus depends on the net impact of these three effects.

Findings from theoretical models and many numerical simulations indicate that, in general, the benefit of the revenue-recycling effect is less than the cost of the tax-interaction effect and thus the overall welfare benefit of the environmental tax is less than it is in the first-best analysis. In a second-best analysis, the optimal tax on emissions is usually below the Pigovian tax, i.e., below the marginal social benefit of emissions reductions. Bovenberg and Goulder (1996) look at the difference in the Pigovian and second-best tax on carbon emissions under various assumptions. They find that the optimal, second-best tax is 10 to 20% less than the Pigovian levy. How the revenues from the emissions tax are recycled is very important: returning revenues in a lump-sum fashion actually leads to an overall welfare loss, according to these authors' analysis. It is imperative that the revenues be used to reduce distortionary taxes such as taxes on labor rather than recycled in a lump-sum fashion.

These results also highlight the importance of using an environmental policy instrument that raises revenue as opposed to a command-and-control mandate or other

regulatory instrument – or *grandfathered* emissions permits. Parry (2004) shows that grandfathered emissions permits lead to a welfare loss and are far inferior to a system in which the permits are auctioned by the government. Dinan and Rogers (2003) reach a similar conclusion.<sup>34</sup> Auctioned permits, like emissions taxes, raise revenue that can be used to reduce other taxes.

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<sup>34</sup> Parry looks at power plant emissions of SO<sub>2</sub>, NO<sub>x</sub>, and carbon. Dinan and Rogers look at carbon.

# ENVIRONMENTAL POLICIES PART IV: LIABILITY AND FINANCIAL ASSURANCE REQUIREMENTS

## I. Introduction

Pigovian taxes, tradeable emissions permits, and various types of “command and control” regulations are all ways in which the government attempts to force private parties to internalize environmental externalities. By regulating behavior, taxing emissions, or requiring permits in order to pollute, the government provides incentives for firms, and others, to undertake activities that lead to reductions in pollution. Another mechanism for providing such incentives is tort liability. We discuss liability in the next section and follow with a discussion of financial assurance requirements.

## II. Strict liability for environmental damages

Tort liability, by forcing injurers to compensate their victims, provides incentives for potential wrongdoers to invest in safety and other precautions to reduce the likelihood that harm will occur (Cooter and Ulen, 2000). In the environmental arena, potential liability can encourage firms to reduce pollution, reduce the likelihood of accidents and spills of environmentally harmful chemicals, reduce exposure to particular chemicals, and undertake a variety of other precautionary activities. In addition, liability has a feature not shared by regulations and taxes: the damage payments directly compensate the victims of the pollution. In this way, liability has a certain fairness aspect to it that government policy does not necessarily have.

There are two basic kinds of liability in the environmental area, strict liability and negligence-based liability. In the case of strict liability, it does not matter whether the injurer intended to do harm but simply that harm occurred due to his actions. With a rule of strict liability and perfect compensation to victims, it can be shown that injurers have the incentive to fully internalize the marginal costs and benefits of precaution and thus undertake the efficient amount of precaution. In situations in which the injured party is unable to engage in any averting behavior to avoid damages, this is the optimal outcome. Under a negligence-based liability rule, it is necessary to prove in a court of law that the party responsible for the environmental harm committed a negligent, reckless, or intentionally wrongful act. Whether negligence-based liability leads to the efficient amount of precautionary behavior depends on how the negligence rule works. In a case of simple negligence with a legally established standard of care, it depends where the standard is set. If it is set at the socially optimal level – the level where the marginal benefits of additional care equal the marginal costs – then a negligence-based liability rule is efficient. If it is set below that level, the injurer is not given enough incentive to take precautions and if it is set above that level, the injurer is overly cautious.

Another liability doctrine, sometimes combined with strict liability (as in the Superfund program), is “joint and several” liability. In cases in which there are multiple injurers, joint and several liability says that any one party can be held responsible for all of the damages incurred regardless of the magnitude of that party’s individual contribution. Tietenberg (1989) shows that in a negligence context, as long as the

standard of care is set at the efficient level, the joint and several doctrine has no effect on the efficiency outcome. In a strict liability setting, however, this may no longer be true. It makes sense for those filing suit to target injurers that are most able to pay. In the case of environmental claims, this could be large firms with so-called “deep pockets”. In this case, those firms have the incentive to engage in a greater than optimal level of precaution while smaller, non-targeted firms engage in a less than optimal amount (Tietenberg, 1989).

Although liability creates proper incentives for precaution in a simple, theoretical sense, economists have argued that there are reasons to look beyond the simple framework. First and foremost is the fact that limited assets may shelter firms from the incentives created by liability (Shavell, 1984). If its liability costs are greater than the value of its assets, a firm can declare bankruptcy rather than pay damages. Since it knows that this is the case, the firm is likely to engage in a less than optimal amount of precaution. Some economists have argued that this leads, in turn, to firms choosing asset levels or financial structures – levels of debt versus equity, for example – so as to minimize the payment of damages in the event of an accident (Pitchford, 1995). It also leads firms to spin off risky operations to smaller, judgment-proof companies. Ringleb and Wiggins (1990) find some evidence of this effect: their empirical analysis of the number of small firms in the U.S. in 1967, prior to the routine use of strict liability for tort claims, with the number in 1980 when strict liability was routine shows that the incentive to avoid liability led to a 20% increase in the number of small corporations. In other words, the existence of liability leads to outcomes that reduce the efficiency intended by the law.

Alberini and Austin (2002) empirically analyze the effect that passage of strict liability laws at the state level have had on the likelihood and frequency of chemical accidents and spills. They use state-level data from 1987-1995 on accidents and spills at manufacturing plants (not during transport) of CERCLA-listed chemicals. They find that states that have more serious spills are more likely to adopt strict liability and that this subsequently reduces the frequency of spills. They also find differences across firms by size – small firms appear to be partially sheltered from liability, as the studies cited above suggested. However, they find no evidence that small firms have become more numerous in states with strict liability. Thus the notion that risky operations are spun off to smaller, judgment-proof firms does not show up in the data that Alberini and Austin analyze.

The bankruptcy problem – i.e., the distortion of incentives for precaution caused by financial insolvency (in the case of strict liability) – has no perfect solution. Some proposed solutions are compulsory insurance, posting bonds, and, of course, replacing *ex post* liability with *ex ante* regulations, taxes, or other government policy such as those we have discussed. In the next section, we discuss some of the economics literature on financial assurance requirements.

### **III. Financial Assurance Requirements**

Financial assurance rules, also known as financial responsibility or bonding requirements, are rules that require potential polluters to demonstrate that they have the financial resources necessary to compensate for environmental damages that may arise in the future from their activities. These requirements can help to overcome the problem brought about by the availability of bankruptcy. They ensure that the expected costs of

environmental risks show up on a firm's balance sheet and in its business calculations and thus provide incentives for a firm to undertake necessary precautionary activities. An additional benefit of assurance rules is that they can bring the scrutiny and knowledge of third-party financial backers to bear on the environmental problem at stake (Boyd, 2002). Because they do not want to lose money themselves on bad business practices, such companies – insurers, sureties, and banks – can make certain requirements of firms before they sell them the financial products used to demonstrate compliance with government requirements. They can also monitor the business practices of the firms they insure.

Financial assurance is currently required of a wide variety of businesses in the U.S. including solid waste landfills, ships carrying oil or hazardous cargo, hazardous waste treatment facilities, underground gasoline storage tanks, and oil wells, to name just a few. Several federal environmental laws stipulate financial assurance – the Oil Pollution Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Resource Conservation and Recovery Act, the Toxic Substances Control Act, and others. And state laws exist as well. Some states even have financial assurance requirements that go beyond the federal requirements.<sup>35</sup> Financial assurance can include insurance, surety obligations, bank letters of credit, and deposit certificates. In addition, firms can establish trust funds or escrow accounts, and some large firms can comply with requirements by demonstrating an adequate U.S. asset base and high-quality bond rating.

Financial assurance is used for two basic types of environmental costs: uncertain environmental liabilities and more defined environmental obligations. An example of an uncertain environmental liability is property damage and health impacts from an oil spill; an example of a more defined obligation would be something like capping and monitoring a landfill after closure. For the former situations, assurance requirements act as mandatory insurance and provide the incentives that insurance typically provides, i.e., cost internalization. For situations with more defined and certain obligations, there is no need for insurance but rather a guarantee that the known obligation will be met in the future. In these cases, bonds are often used; with bonds, the bond provider typically pays only if the firm is unable to do so because of insolvency. In this case, the bond insures not against the possibility that the environmental problem will arise – that is a certain outcome – but rather against the possibility that the firm will no longer be able to pay the costs.

Financial assurance purchased from a third party is usually preferred over self-demonstrated assurance. For one thing, self-demonstrated assurance requires the government to monitor the firm's financial condition over time, something that government environmental regulators may not be well-equipped to do (Boyd, 2002). For another, a firm's financial condition can change quickly, leaving it unable to meet its environmental obligations.

In some cases, assurance is provided by public funds. In general, this is not desirable as public funds from taxes that are unrelated to firms' safety records and risk management create no incentive for firms to change behavior. Moreover, public assurance funds can undermine private markets for assurance.

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<sup>35</sup> An example is California's requirement on oil-carrying vessels to demonstrate \$1 billion in coverage for oil pollution damages.

Other methods of financial assurance such as insurance, letters of credit and surety bonds, cash accounts, corporate guarantees, and trust funds are discussed in Boyd (2002). We do not discuss the differences in these instruments here.

Financial assurance requirements serve a very useful function. This does not mean that they always operate perfectly, however. Boyd (2002) points that there are two key design issues associated with financial assurance requirements: the first concerns the appropriate scope of the requirements and the second concerns the question of how the security of the mechanism can be guaranteed. Issues of scope have to do with the obligations and liabilities that are covered by the assurance and the dollar value of coverage that must be demonstrated. For a highly uncertain and far-distant event, it can be difficult to estimate what the costs of the event will be. Government is always trying to balance compliance costs against the desire to maximize deterrence and compensation, and this can be a difficult task. Once the level of assurance is chosen, the government needs to ensure that the mechanisms that the firms use to comply with the requirements are secure and funds are available in the future to pay damages. In some cases, firms can fail to comply. Another problem is that the third-party providers of assurance – banks, insurance companies, and the like – can become insolvent. Finally, the financial mechanisms themselves can be flawed; self-demonstrated financial assurance is particularly a problem, as we mentioned above.

Despite these potential design problems, the financial assurance concept is quite useful for providing the proper incentives to deal with particular environmental problems. Combined with liability, it helps to ensure that payments can be made to injured parties and for clean-up in the event that damages occur, and more importantly, the mechanisms themselves provide incentives for firms to take precautions and care to avoid pollution damages in the first place. Financial assurance is most useful for dealing with uncertain environmental outcomes and damages that occur in the future rather than the present. Leaking underground storage tanks, chemical spills, oil spills, groundwater contamination from landfills due to liner failure, and a host of other kinds of events are problems best addressed by financial assurance.

# ENVIRONMENTAL POLICIES AND EQUITY

## I. Introduction

Economic evaluations of environmental policies have traditionally focused on pure efficiency effects—either a comparison of their economic costs and environmental benefits, or a comparison of their costs relative to those of alternative control policies (e.g., Cropper and Oates 1992, Morgenstern 1997, Hahn 2005). However, the distribution of policy costs and benefits across households and firms is receiving increasing attention among researchers and policymakers. One reason is concern about whether a policy is “fair” or not. Another is political feasibility—a policy justifiable on efficiency grounds may be impractical if it imposes a disproportionate burden on a politically influential group. Often the two are critically related; for example, political opposition to higher fuel taxes, carbon taxes, or other emissions taxes in the United States is frequently based on the claim that such taxes fall most heavily on low-income groups.

## II. Results in the Economics Literature on the Incidence of Environmental Policies

A recent study by Parry et al. (2005) summarizes what is actually known, and not known, about the incidence of benefits and costs from various pollution policies across household income groups. The study first shows the effects of pollution taxes, tradeable permits, and a command-and-control performance standard in a conceptual model that highlights the importance of revenue recycling, ownership of capital (in the case of economic rents to permit holders), the extent to which higher prices are passed forward to consumers, and a variety of other factors. The authors then look at the empirical literature on the incidence of various policies.

There are many studies that look at the costs of various types of taxes and other policy instruments across income groups. In general, these studies find that gasoline taxes, carbon and other energy taxes, and various kinds of motor vehicle taxes all tend to be regressive – i.e., lower income households pay a higher fraction of their income on these taxes than do higher income households – but the impact is lessened if the revenues are recycled in the right ways and also if the income measure used in the analysis is lifetime income rather than annual income. Also key, in the case of energy and carbon taxes, is the extent to which the tax is passed on in the form of higher product prices versus borne by shareholders. And in general, the regressivity finding is less pronounced for taxes on intermediate products than for taxes on final goods. So, for example, a tax on coal is less regressive than a tax on gasoline.

Parry et al. (2005) explain that studies of tradeable emissions permits find that distributional effects hinge crucially on whether permits are grandfathered or auctioned, and whether revenues from permit auctions, or from indirect taxation of permit rents, are used to cut payroll taxes, corporate taxes, or provide lump-sum transfers.

Analyzing the distribution of the benefits of environmental policies is much more difficult, as explained in Parry et al. (2005). To do so accurately requires that the researcher be able to compare not just emissions but hopefully exposure or reductions

in risk in a pre- and post-policy setting and do so across income groups. Most studies are unable to do this but instead carry out more simplistic exercises. The literature finds that there are some cases where actual policies have tended to skew benefits toward the poor (e.g., the Superfund program) but other policies where this is not the case (e.g., the SO<sub>2</sub> trading program). Translating environmental improvements into welfare further muddies the picture. On the one hand, Parry et al. find that most available evidence suggests an income elasticity of willingness-to-pay below unity, implying that the same emissions reduction for rich and poor households would represent a larger share of the poor households' income. On the other hand, capitalization of environmental improvements into housing values may disproportionately reduce benefits to low-income households. The authors conclude that much work remains to be done on all of these issues.

# POLICIES FOR WASTE DISPOSAL AND RELATED EXTERNALITIES

## I. Introduction

There are several theoretical studies of alternative policy instruments designed to address solid waste disposal externalities. In addition, there is one study that empirically estimates the costs of three different policy instruments. We discuss these studies here.

## II. Combined Output Tax/Recycling Subsidy

As explained in our paper on Pigovian taxes, one potential problem with taxing waste disposal directly is that it could lead to illegal dumping. This possibility has led several economists to focus their research efforts on analyzing alternative policies that have the incentive effects of a disposal tax without that tax's attendant illegal disposal problem. There are several articles by economists that address this issue in theoretical models. Papers by Dinan (1993), Sigman (1995), Fullerton and Kinnaman (1995), and Palmer and Walls (1997) all use models of the product life-cycle, including raw material extraction, final product production, consumption, and disposal and recycling, and allow for the possibility of illegal dumping, and use the models to analyze alternative policy instruments. All of these papers highlight the efficiency of a combined product tax and recycling subsidy and show that this kind of "deposit-refund" instrument has many of the desirable features of a Pigovian waste tax without that creating incentives for dumping. Like the Pigovian waste tax, consumers end up paying a tax only on those units of the consumption good that are not recycled.

These studies refer to a per-unit (or per-pound) tax on output and a per-unit (or per-pound) subsidy for recycling as a deposit-refund and we use that terminology here. It is important to understand that we do not necessarily mean a "bottle bill" type deposit-refund where consumers pay a deposit (tax) when purchasing a product and receive a refund (subsidy) equal to the deposit when they return the product for recycling. The deposit-refund policy economists solve for in these models is more often a more general system where producers pay a per-unit fee or tax up-front (though the fee would be passed forward to consumers in a higher product price) – sometimes referred to as an "advance disposal fee" (ADF) or "advance recycling fee" (ARF) – and collectors of used materials receive a per-unit subsidy on all items collected and recycled. Palmer and Walls (2002) use the term "upstream combined tax/subsidy" (UCTS) to refer to this type of system to distinguish it, in policy circles, from a bottle bill deposit-refund and this terminology has been adopted in many Organization for Economic Cooperation and Development (OECD) studies on waste policies (see OECD, 2000, for example).

Fullerton and Wolverton (2000) advocate the use of this type of combined tax/subsidy policy for many environmental problems in lieu of an emissions fee approach. They argue that, in many instances, it is difficult or prohibitively costly to monitor and measure emissions, thus a true Pigovian emissions tax is out of the question. In its place, policymakers can use a combination of a tax on output and a subsidy to "clean" inputs to achieve the same outcome.

### **III. Virgin Materials Tax, Recycling Subsidy, and Recycling Investment Tax Credit**

Several of the studies listed above analyze a variety of other policy instruments in comparison with the tax/subsidy combination. Dinan focuses on a virgin materials tax. She finds that such a tax cannot generate the overall social optimum unless it is coupled with an output tax. She obtains a similar result for a recycling subsidy. In general, both Dinan and Fullerton and Kinnaman find that an input-targeted policy like a virgin materials tax or recycling subsidy cannot generate the optimal amount of waste disposal unless combined with a tax or subsidy on output. Palmer and Walls (1994) get a similar result: they find that a virgin materials tax must be combined with an output tax and a tax on other inputs to production.

These authors also analyze a recycling investment tax credit; since a tax credit is similar to a per-unit subsidy to recycling, the same result holds – by itself, it cannot generate the optimum but must be combined with an output tax. The problem with a subsidy to recycling is that while it provides an incentive for more recycling and more secondary material use in production, it does not provide any incentives for reduced production and consumption. In fact, by lowering the cost of production, it provides an incentive to increase production and thereby increase waste. The virgin materials tax is even more problematic; by taxing one input to production, it provides an incentive for firms to shift to other inputs – not just secondary materials, which is a desirable outcome, but other inputs as well, such as capital, labor, and energy. To avoid distortions in those markets, policymakers would need to place corrective instruments on those inputs.

Fullerton and Kinnaman modify their model to include an externality due to virgin material use, along with the waste disposal and illegal dumping externalities. Such an externality could be due to, for example, forest clear-cutting or coal strip-mining. In this case, there is a rationale for a virgin materials tax but only to correct for the upstream, extraction-related externality and not for the externalities further down the product life-cycle.

### **IV. Empirical Estimates of Costs for ADF, Recycling Subsidy, and Combined Tax-Subsidy**

Palmer, Sigman, and Walls (1997) provide some empirical evidence on the cost advantages of the deposit-refund for reducing waste. They parameterize a simple model of waste disposal using estimated demand and supply elasticities for aluminum, glass, paper, plastic, and steel, along with baseline 1990 prices and quantities of those materials in the waste stream. They then use the model to simulate policies to reduce a specified quantity of waste. The three price-based policies they analyze are: (i) an ADF, (ii) a recycling subsidy, and (iii) a deposit-refund (or combined ADF/recycling subsidy).<sup>36</sup> For any percentage reduction in waste, the deposit-refund is always the least-cost approach, and as the percentage rises, the other two policies get increasingly more costly relative to the deposit-refund. The recycling subsidy is the most costly of the three approaches. Thus, Palmer, Sigman, and Walls show, quantitatively, the importance of having a policy instrument that targets both source reduction – i.e., reductions in output – and recycling. For a 10% reduction in waste disposal below 1990 levels, a deposit-

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<sup>36</sup> In policy circles, an ADF (or ARF) is sometimes automatically considered to be a policy with a fee on the product combined with a payment made for recycling. When we use the term ADF or ARF, however, we mean only the fee itself and not any implied uses of the revenues generated such as a subsidy. When we do mean that, we refer to the policy as a combination instrument.

refund of \$45 per ton is needed. The authors explain that this is the marginal cost of reducing waste. To get the same reduction, an ADF would need to be \$85 per ton and a recycling subsidy \$98 per ton. These two policies, by only targeting either source reduction or recycling but not both, are more costly than the deposit-refund.

## **V. Recycled Content Standard**

Palmer and Walls (1997) analyze a recycled content standard, i.e., a mandate that producers must use a certain amount of secondary materials as a fraction of total material use in production. Like a virgin materials tax or a recycling subsidy, the recycled content standard alone cannot generate an optimal amount of waste. It must be combined with an output tax and taxes on other inputs. Furthermore, Palmer and Walls find that there are drawbacks to the standard even compared to the tax or subsidy approach. First, the output and other input taxes required depend on the marginal products and marginal rates of technical substitution of the inputs used in production. It would be difficult for government policymakers to have access to such information for setting the right levels of the instruments. In addition, if firms in an industry differ, a single standard applied to all firms would not be optimal. One could set an industry standard and allow trading across firms, but this is a complicated arrangement when combined with the necessary input and output taxes as well. Palmer and Walls argue that the deposit-refund approach – i.e., the tax on output and subsidy to recycling – would be far simpler.

## **VI. Results from More Complex Models Analyzing Waste**

The theoretical studies focused on solid waste and reviewed thus far do not include, in any significant way, other environmental problems besides waste disposal. They also do not incorporate any producers' design decisions about their products, only input and output choices. In this section of our review, we look at studies that do include such effects.

***VI.1. Life-Cycle Pollution and Waste Externalities.*** Although most of the studies above have a mass balance condition, thus raw materials flow into the production process and eventually lead to waste after consumption, the models include no waste or pollution by-products in the production process. All raw materials end up eventually as post-consumer solid waste. Walls and Palmer (2001) develop a model that does include such effects. In their model, which harkens back to the work of Kneese, Ayres, and others we mentioned above, a producer uses virgin and secondary material inputs, labor, and a non-material input that generates pollution during the production process. This pollution can be reduced if the producer undertakes abatement activities, which are also specified in the model. The model also includes a solid waste by-product during production in addition to the post-consumer solid waste. The authors analyze the optimal set of policies to address these multiple environmental problems that occur throughout the product life-cycle and specifically address the question of whether a single policy instrument can address multiple problems. In keeping with a long-standing result in economics (Tinbergen, 19XX), Walls and Palmer find that, to reach the social optimum, at least as many policy instruments are needed as policy problems. Thus, one instrument, such as an ADF, cannot fully internalize the externalities.<sup>37</sup>

If taxes on emissions and industrial waste are not feasible, say, because of illegal dumping or monitoring problems, the authors find that taxes on all the inputs to production are necessary, along with a deposit-refund type instrument – i.e., an output tax and recycling subsidy – to generate the overall social optimum. If the industrial pollution is subject to a regulatory standard, either a limit on emissions per unit of output or per unit of the polluting input (such as energy) partially internalizes that externality. In the case of the standard per unit of output, additional taxes on input use are unnecessary but the deposit-refund is still called for and the deposit component of that policy – the output tax – is adjusted upward to account for the fact that the emissions standard is on a per-unit of output basis. With the standard per unit of polluting input, a tax on input use is necessary.

Walls and Palmer show that the optimal taxes are rather complicated in many of the cases they analyze because of the multiple environmental issues at stake. The authors emphasize that it is thus critical for policymakers to consider life-cycle impacts when setting optimal policies. Life-cycle analyses (LCAs), however, often do not provide the information necessary for setting policies. LCAs present summary information on all inputs, including raw materials and energy, and emissions and waste from production of a particular product. But not all inputs to production are bad and the relative damages from emissions and

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<sup>37</sup> A more general model of pollution by Hahn (1996) highlights the problem of multiple environmental problems.

waste – i.e., the impacts on social welfare – are not calculated in LCAs. In fact, there is no way, without additional information outside the LCA framework, for someone to evaluate what X tons of one pollutant versus Y tons of another versus Z btus of energy input really mean. Finally, LCAs provide a snapshot of the current situation but not the level of such inputs and pollution at the social optimum or any other level.

**VI.2. Design for Environment.** None of the studies discussed so far here address the issue of product design. The first study to do so was Fullerton and Wu (1998). These authors constructed a theoretical model in which producers choose an amount of packaging for their products and a degree of recyclability, where recyclability is the fraction of the product that can be recycled. They then solved for optimal policies under a range of different assumptions about missing markets and the feasibility of various policy instruments. If markets function properly and price signals are passed from households through recycling markets and back upstream to producers, and vice-versa, then a socially optimal amount of waste and recycling and an efficient product design can be obtained. Either a tax on waste disposal or an equivalent deposit-refund will send the right signals. If recycling markets do not operate, however, the authors find that additional instruments are necessary, in particular, a subsidy to recyclability.

Calcott and Walls (2000; 2005) also address “design for environment” (DfE) concerns.<sup>38</sup> Like Fullerton and Wu, they discuss the possibility that recycling markets do not operate efficiently and argue that, in practice, it is likely that they do not. In particular, recyclers probably do not pay a price for secondary materials that varies with degree of recyclability. Moreover, curbside collection programs where many different materials are collected together and no price is paid for those materials compound the problem. Calcott and Walls (2005) construct a model in which markets are not missing entirely but operate with transaction costs; in addition, they allow for the possibility that consumers imperfectly sort products into trash and recyclables. They show that although a first-best social optimum is unattainable with any feasible policy instrument in this setting, a constrained, second-best, optimum can be achieved with a rather simple approach. Again, a deposit-refund has much to recommend it. Calcott and Walls (2005) find that a deposit-refund applied to all products, regardless of recyclability levels, combined with a modest waste disposal fee – one that is less than the marginal social cost of waste disposal – leads to the constrained optimum. The existence of markets, even imperfectly functioning ones, spurs producers to design their products to be more recyclable and the waste fee and deposit-refund reduce waste flows. An unusual finding in the Calcott and Walls studies is the finding that the deposit-refund is not a substitute for a waste disposal fee but rather a complement to it.

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<sup>38</sup> Eichner and Pethig (2001) is another study that incorporates design in a model of waste policy. However, they focus primarily on material substitution. Calcott and Walls (2005), in an appendix that applies an extension to their basic model, also incorporate material substitution but find that their basic policy results, which we summarize here, do not change.



# Appendix F: National Research Methodology and Key Results

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Tellus Institute conducted a focused literature scan and internet search of waste reduction incentives from throughout the U.S., with some attention on Canada and Europe. The methodology utilized for the national incentive review plus key results are presented in this appendix. Even prior to the national research, the Cascadia Team members were intimately familiar with a wide range of existing incentives and disincentives that have led to current material flow practices. Such incentives and disincentives relate to all phases of materials' life cycle, from extraction to processing, manufacturing, distribution, use, and disposal. Some relate to federal law, policy, and regulations, while others occur at the state or local level.

We did not attempt to conduct an exhaustive review of all types of incentives for both state and federal governments, as well as private and third party organizations. While this would have produced a great volume of material, such undifferentiated results would not have been particularly useful to the Department in fashioning a set of powerful incentives that have real potential for application in Washington. Thus, in carrying out the state- and national-level review, we drew on our collective experience to identify and target those existing incentives and disincentives that are understood to have the most significant impacts on materials use and waste and pollution generation. We focused particular attention on state-level programs, which is where most of the innovative approaches have been implemented and is the predominant sphere within which the Department of Ecology operates.

The starting point for our research was the fairly comprehensive Beyond Waste Tools Matrix that Cascadia and Ross & Associates had compiled for Ecology as part of its Issue Paper #2: Achieving the Beyond Waste Vision, a Framework for Moving Forward (March 24, 2003). Since this initial matrix included a broad set of waste reduction tools, ranging from traditional compliance assistance to innovative incentives, our first step was to remove categories that were beyond the scope of this project. We then completed a focused literature scan and internet search in order to add additional incentive categories to the matrix, find more examples of implementation, and gain more data about the rationale, benefits and challenges of each tool. This revised matrix is presented as Appendix G.

Key sources that the team reviewed are presented below, with additional sources listed at the end of this appendix were:

- Ecology's Beyond Waste reports;
- The National Pollution Prevention Roundtable (NPPR) website and publications, including *The Source: the Ultimate Guide to State P2 Legislation* (2000);
- Tellus Institute's State Pollution Prevention Regulatory Integration Initiative (SPRINT) project reports, including: [\*Pathways to State Pollution Prevention Regulatory Integration: A Compendium of Innovative Practices for States\*](#) (1998);
- The Northwest Product Stewardship Council's website (<http://www.productstewardship.net/about.html>);

- Staff and program materials from leading state environmental agencies such as the CA Integrated Waste Management Board, CO DPHE, MA DEP, MN OEA, OR DEQ, PA DEP, and others;
- EPA's Resource Management Contracting, Resource Conservation Challenge, Extended Product Responsibility and Performance Track Programs.

The incentives Tellus identified through this search were then combined with additional economic incentives identified by team member Margaret Walls as well as ones identified by Cascadia in their stakeholder outreach. We catalogued the combined results of this search in the Tools Matrix format and presented it as an interim deliverable to Ecology in May. We included basic information – rationale, benefits and challenges – about the incentives and disincentives we identified., with detailed data presented only for those that we identified as having high potential for impacting secondary material flows in Washington. The incentives Tellus identified were then combined with additional economic incentives identified by team member Margaret Walls as well as ones identified by Cascadia in their stakeholder outreach. The result was an expanded tools matrix with many examples of where the various incentives have been implemented.

The project team discussed the expanded matrix with Ecology staff to identify particular incentives and disincentives warranting further information gathering and analysis. As a result, the initial matrix of 54 incentive tools was refined to a list of 20. This approach allowed Ecology and the Cascadia team to delve into more detail about the social, economic, environmental, political, and logistical considerations for those items in the matrix of greatest interest. For most of these incentives, the team wrote a two-page evaluation summarizing the background, examples of implementation in other areas, how such an incentive might work in Washington, and numerical ratings according to the criteria laid out in Appendix B. The ratings are summarized in Appendix C.

## KEY RESULTS

- Fifty-four potential incentive tools were identified and summarized in the refined and expanded Tools Matrix.
- Twenty incentives utilized or considered in other states that seemed especially useful for Washington were identified and evaluated.
- Ecology is among a small number of leading states offering innovative incentives for waste reduction. Most states still focus the vast majority of their efforts and resources on compliance and enforcement efforts. In our research, Washington continually surfaced as already implementing incentives we identified from around the country, such as required P2 Plans, hazardous waste fees, and state procurement specifications preferencing recycled materials and reuse.
- Ecology is also a leader in creating a broad framework to guide waste and materials policy, Beyond Waste, and to attempt to systematically integrate waste reduction and materials reuse incentives within such a framework.
- Incentives programs can be sector focused or broad-based and cross-sectoral. Most tax and financial incentives tend to be broad-based, while many of the successful regulatory flexibility programs focus on specific sectors and include customized incentives important to the targeted sectors.

- Recognition programs are considered far more valuable and effective when coupled with other incentives, particularly regulatory flexibility.
- Tracking the impact of incentives is complicated and not often part of incentive programs.<sup>39</sup> However, effective measurement is critical in order to gauge effectiveness, refine program approaches, and effectively allocate staff and financial resources. New tools such as the statistical approach used by Environmental Results Programs in several states, and the PA DEP's Residual Waste reporting and tracking program for non-hazardous industrial wastes are promising measurement tools that merit consideration.

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<sup>39</sup> One complicating factor is the need to normalize results for changes in product lines or production levels. For each product, therefore, measurement programs need to establish accurate baseline data on production levels, waste generation, and secondary materials reuse so that tracking systems measure waste or materials reuse per unit of product over time.

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# **Appendix G. Incentives Matrix**

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[Incentives Matrix Inserted Separately]



# **Appendix H. Final Presentation**

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Attached are the presentation materials discussed with Ecology Senior Management on June 27, 2005.



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