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INCENTIVE-BASED POLICIES FOR MUNICIPAL SOLID WASTE MANAGEMENT

**SUMMARY OF WORKSHOP PROCEEDINGS
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JOHN F. KENNEDY SCHOOL OF GOVERNMENT

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CITATION AND REPRODUCTION

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This workshop was part of Project 88/Round II, co-chaired by Senator Timothy Wirth and Senator John Heinz, directed by Professor Robert Stavins, and dedicated to the memory of John Heinz and his vision of improving environmental policy through the application of economics. The project focuses on the design and implementation of incentive-based environmental policies in three areas: global climate change; hazardous and solid waste problems; and resource management issues. In addition to this workshop, the project includes a seminar series, three other policy workshops, a public affairs forum, policy reports, and student internships.

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OVERVIEW: Robert N. Stavins, Assistant Professor of Public Policy, John F. Kennedy School of Government, Harvard University

This workshop explores economic-incentive or market-based approaches to municipal solid waste management. Held at the John F. Kennedy School of Government, Harvard University, under the auspices of its Center for Science and International Affairs and the Taubman Center for State and Local Government, the workshop is part of Project 88/Round II, a two-year, multi-faceted program which focuses on the design and implementation of incentive-based environmental policies. The overall project is co-chaired by Senator Timothy Wirth and Senator John Heinz, and dedicated to the memory of John Heinz and his extraordinary vision of improving environmental policy through the application of economics.

In the past three years, increased attention has been given on both sides of the Atlantic Ocean to a new set of environmental policies which recognize market forces, not only as part of the problem, but also as a potential part of the solution. In Washington, the debate has advanced rapidly, culminating with the 1990 overhaul of the Clean Air Act which incorporates a market-based approach -- a tradeable-permit system for acid-rain control.

One catalyst for this swift set of developments was the bipartisan study sponsored by Senator Timothy Wirth of Colorado and the late Senator John Heinz of Pennsylvania to find innovative solutions to major environmental and resource problems. Their first "Project 88" report was a team effort by 50 individuals from government, business, environmental organizations, and academia. The report outlined 36 recommendations which would enlist the forces of the marketplace to deter pollution or reduce natural resource degradation.

Those recommendations were based on the understanding that selective use of incentive-based mechanisms can enable us to achieve greater levels of environmental protection at lower overall costs to society. Incentive-based approaches can do this by making producers and consumers face the full social costs and consequences of their decisions at the time they are made, not afterwards when it is too late to affect behavior. The general range of incentive-based policy mechanisms spans: (1) pollution charges or fees; (2) tradeable permits; (3) deposit-refund systems; (4) market-barrier reductions; and (5) government-subsidy elimination.

As the first Project 88 report served to facilitate some initial steps towards reform of environmental policies, the Project 88-Round II report is intended to take the more difficult step of describing how these good ideas could actually be put to work and implemented. In this context, Senators Heinz and Wirth decided to focus on design and implementation issues of market-based approaches to three significant environmental problem areas: (1) global climate change; (2) solid and hazardous waste management; and (3) natural resource management. This workshop is one element of the ongoing Project 88-Round II effort, which will involve seminars and workshops on a variety of issues.

Municipal solid waste (MSW) management is a challenge with broad human health and ecological consequences. It is clearly not a single policy problem, but rather covers a

broad range of environmental problems with no easy solutions. The workshop begins by focussing on the dimensions of the problems, followed by a consideration of ways to supplement current policies with improved uses of incentive-based mechanisms. The mechanisms to be considered include: improved price signals; recycling; and deposit-refund systems. Today's workshop will focus primarily on the demand side of MSW management. Not on today's agenda are issues more closely related to hazardous waste management, Federal policies and programs, the supply of MSW management services, and site location (so-called NIMBY -- not-in-my-backyard) problems. We will investigate these topics in later workshops.

DIMENSIONS OF THE PROBLEM: Marjorie A. Franklin, President, Franklin Associates

Municipal solid waste is defined by the EPA under Subtitle D of RCRA legislation as including residential, commercial and institutional wastes. Subtitle D wastes cover more than just MSW, encompassing municipal sludge, industrial wastes, and mining wastes. So, the landfill problem reflects far more than just MSW.

MSW generation has changed over the past two decades, with growth in paper and paperboard, and plastics (Table 1). Trends in MSW generation over the past two decades show increases in paper and plastics, both in terms of tonnage and percentage of MSW. Both glass and metals generation have been rather flat in terms of tonnage. MSW generation by product category is led by "containers and packaging," followed by non-durables, food wastes, and yard wastes. Recycling rates are highest for paper and cardboard, followed by metals and glass. Paper and cardboard account for about 75% of recovered materials by weight.

Table 1: U.S. Municipal Solid Waste Generation, 1988

Component	Share of Total Weight
Paper and Paperboard	40.0%
Yard Wastes	17.6%
Metals	8.5%
Plastics	8.0%
Food Wastes	7.4%
Glass	7.0%
Other	11.5%
TOTAL	100.0%

Volume is really the issue of concern when considering landfill life, and it differs from waste weight. Paper and paperboard account for an equal share of weight and volume of MSW, while yard wastes account for twice as much weight as volume. Conversely, plastics and metals together account for about twice as much volume as weight.

The traditional hierarchy of MSW management strategies was developed in the 1970's, and is still considered useful today: (1) reduce; (2) reuse; (3) recycle; (4) compost; and (5) combust or landfill. An interesting issue today is the potential incompatibility of source reduction and recycling. For example, a light-weight packaging material may be desirable for source reduction, but may not be recyclable. The issue of recycling and source reduction is further complicated by a lack of common standards and definition.

Trends in MSW management show a decrease in reliance on landfilling, with an increase in use of other options. Waste generation has kept increasing over the past two decades at a rather steady rate, with some obvious dips during economic recession. Incineration declined steadily through the 1970's and early 1980's along with increased air-pollution controls. Landfilling has declined since 1984 with the growth of environmental regulations affecting landfills. Since 1984, there has been an increase in incineration, materials recovery, and composting.

SESSION I: IMPROVED PRICE SIGNALS -- UNIT CHARGES FOR COLLECTION & DISPOSAL

INTRODUCTION: Tony Gomez-Ibanez, Professor of Public Policy and Urban Planning, John F. Kennedy School of Government, Harvard University

The focus of this session is on unit charges -- charging for the collection and disposal of MSW according to the amount of waste generated. This approach could be an important step in the right direction for some communities. A unit-charge system must involve separate billing for MSW services and must make bills dependent on the amount of waste disposed of, either in terms of weight or volume. Some of the design issues that will be discussed today include how much charges can actually reduce waste generation, implementation factors, and non-compliance. Finally, there are equity implications that must be considered.

HOUSEHOLD SOLID WASTE MANAGEMENT OPTIONS: Haynes C. Goddard, Director, Latin American Studies, University of Cincinnati

A primary question surrounding the use of unit charges for household waste disposal is whether or not these systems work. To determine this we need to assess the impacts of such systems upon: waste flows; source reduction and recycling program finance; landfill life; NIMBY problems; the need to export wastes; and illicit dumping and littering.

In examining the impact on waste flows, unit charges are capable of stimulating recycling, but a tough question remains: what is the right combination of recycling and source reduction? In terms of financing MSW service, unit charges are well suited to help, especially when services are run on a utility basis. This is the case in cities like Seattle or Tacoma, where MSW services are provided by a free-standing utility.

Landfill life can be extended by unit-charge systems, but the big question is *how much* extension should a community buy. For example, recycling in Cincinnati costs \$150/ton, while landfilling costs \$15/ton; the key question is what is the optimal amount of recycling for a given community? In terms of facilities siting, there is great potential for MSW management utilities to use proper pricing to raise revenue to compensate communities for accepting MSW facilities.

The implementation of unit charges requires a recording system, a billing system, and a measuring/weighing system. There are three general options: (1) centralized billing, as used in Tacoma, where cans are actually counted and tabulated on the route and then billing made accordingly; (2) subscription basis, as done in Seattle; and (3) a weight-based system. Bag-and-tag systems are a popular option today, and are really a sort of hybrid between the first and second options. Other implementation issues that must be considered include monitoring and enforcement, and public acceptance. It is no simple matter to begin charging for a service which has traditionally been free, or priced on a flat rate. A final

observation is that the business response to unit charges can be expected to be prompt and often positive. Overall, unit charges appear to have the potential to affect consumer choice and demand, with subsequent impacts on manufacturers' production choices.

MUNICIPAL SOLID WASTE MANAGEMENT IN SEATTLE: Diana Gale, Director, Solid Waste Utility Division, Seattle Engineering Department

Seattle MSW management now includes an array of unit charges and recycling incentives. This has developed in Seattle because of a variety of historical and other factors. First, the Solid Waste Management Division in Seattle is a utility, and has been since the 1960's. As a utility, it has an enterprise fund and a tradition of charging for all of its services. The utility has had a rate structure in place since the early 1960's. Although it was just a small flat rate, there was a billing structure in place and public familiarity with paying for MSW services. About 82% of utility revenues comes from rates, and are applied towards the annual operating budget of \$63 million.

In the early 1980's, solid waste problems arose and Seattle started to change over to volume-based rates. This change was facilitated by experience in the 1970's with electric utilities switching to increasing block rates. This led to local familiarity with such rate structures and to econometric analyses of the resulting public behavior. In 1981, volume-based rates were set at \$5.00 for the first can plus \$1.50 for each additional can. Little change in generation behavior was noted, but a five-year period of waste densification resulted.

In 1986, a crisis in solid waste management involving local Superfund sites set the stage for implementation of a new MSW management program: higher incentive-based rates along with a full range of options for consumers. The general objective was to encourage waste reduction and recycling, while offering broad consumer choice and rewards for proper behavior. The program was designed to be voluntary and to utilize economic incentives to change behavior. The new program evolved as follows. From 1986 to 1988, the volume-based rates were increased 86%. In 1988, curbside recycling was started free of charge. In 1989, separate yard waste pickup was started at \$2.00 per month (disposal available at the transfer station at a reduced rate). Household compost bins were made available free of charge and with a free lesson in proper use. Subsidized household hazardous-waste collection was also started.

The volume-based rates for households were steepened further in 1989. The rates contain a fixed minimum charge, plus a stopping charge, plus a tonnage charge that varies with can volume. Special backyard service is also available for an extra charge. The 1989 rates are found in Table 2. The impact of the rate structure has been dramatic; about 89% of the city is on one can or less per week. Participation in recycling is about 85%, and 66% in yard waste collection. Finally, in one year there has been a 22% reduction in the amount of waste taken to landfills.

Table 2: Seattle Solid Waste Utility, 1989

Size of Can	Monthly Rate for Weekly Service	Subscription Rate
19 gallons	\$10.70	24%
32 gallons	\$13.75	63%
60 gallons	\$22.75	12%
90 gallons	\$31.75	1%

Further developments include an experiment with a weight-based pilot project. The pilot project has utilized bar-coded cans, curbside weighing, instantaneous computer printout, and billing on a weight-basis. Half of the test population has said they prefer it to the volume-based rates. Another development is the upcoming introduction of a 10-gallon micro-can, demanded by some customers.

Overall, the Seattle experience has shown that volume-based rates can work if they are implemented in concert with other program options. It is important that customers have broad choices, and that programs are convenient. Some cheating will be inevitable, and it may have been as much as 5% in Seattle. Finally, essential ingredients for success are a fairly complex billing structure and extensive public education.

RESPONSE: Douglas Ziesemer, Assistant Commissioner, Solid Waste Management, Chicago Department of Streets and Sanitation

It is difficult to transfer the success of a particular MSW management program from one city to another, because of differences in the citizenry, geography, politics, and MSW management objectives. For example, compared to Seattle, the City of Chicago has lower average per capita income, lower levels of education, and a higher poverty rate. In terms of political factors, Chicago has long been a "full service city" for MSW collection -- if it is put out, it will be picked up. Such a longstanding political commitment is hard to change. The objective of MSW management in Chicago is cost-effective sanitation -- keeping garbage off the streets and picking it up in the cheapest way. Waste containerization is thus important, and in the early 1980's the city switched to 90-gallon carts and a semi-automated pick-up mechanism. It would thus be difficult to switch to a "bag and tag" system, where there would be the risk of animals ripping open bags.

In terms of urban geography, 88% of all MSW in Chicago is collected in alleys, with only 12% collected at curbside. In contrast, in Seattle almost all collection is curbside. Collection in out-of-sight alleys means that extensive monitoring and control would be

necessary for a unit-charge system. Program and city size are also important factors. It is often erroneously assumed that successful experiences can be scaled-up, with economies of scale leading to low unit costs. Experience in the 1970's with Refuse Dry Fuel (RDF) projects, which did not scale-up very well, shows that this is not always true.

Another concern with a unit-charge approach is finding the financial resources for program implementation and management. Growing environmental regulations continue to increase the costs of disposal, draining already scarce municipal resources. Raising new capital for start-up and implementation of complex unit-charge and recycling programs seems unlikely in such a situation. The political reality of a new unit-charge system is that it will be seen by much of the public as simply another form of taxation. However good the idea is, civil servants still work for the elected officials who must answer to the public.

DISCUSSION

a. Implementation of a Unit-Charge System

In the discussion, there was general support for unit-charge systems, while recognizing the importance of differences in city makeup and MSW management objectives. A common theme was that no single system was applicable everywhere since each municipality's unique characteristics define the range of design options.

As a first step in implementing a unit-charge system, it was recommended that property tax bills be itemized to show the portion that actually goes to MSW collection and disposal, although the vast array of services now subsidized by governments makes it difficult to disentangle MSW management expenses. Voluntary systems were suggested as a viable option where there was a well-informed public. It was agreed that no system would succeed if forced on the public.

Several participants commented on the strong public support for unit-charge or recycling systems. Despite the traditional nature of MSW management in Chicago, for example, surveys have shown strong public demand for recycling. Chicago is now experimenting with a "Blue-Bag System" serving 65,000 households, utilizing separate bags for recyclables and yard waste. Participation has varied between 15% and 85%. A plea was made for a "what-if" attitude in government, and a willingness to experiment. It was suggested that use of volume-based MSW management systems can be a win-win situation for all, because most flat-rate systems are regressive in nature. The many citizens who generate less than the average amount of waste stand to save money if charged on a volume basis.

There was disagreement regarding the potential net benefits of managing MSW systems as utilities. While Seattle is often cited as an example of MSW management success as a utility, New Jersey was said to have a wide range of problems despite having MSW management utilities. It was countered that New Jersey's waste-exporting problems were due simply to strict state landfill regulations.

b. Recycling

The importance of a strong market for recyclables was stressed. In the northwest, the markets have been better than in other areas of the country, it was commented. The markets have weakened, however, since the Seattle programs were started, and prices received have declined from an average of about \$55 to \$37 per ton. The contamination rate for recyclable materials collected at curbside in Seattle was found to be higher for a "commingled" recyclable program (4%) than for a separate stackable containers program (0.6%).

c. Demographics

The difference in recycling participation due to demographics was noted as a very sensitive issue. Seattle research into program effectiveness has found that about half of the difference in success between two curbside programs was attributed to demographics, particularly the level of formal education. The other half of the difference was attributable to program design. It was noted that almost all of the Seattle MSW public education program has been written, and that radio and television should probably also be used.

d. Volume-Based Rates and Multifamily Dwellings

There were many views expressed on the challenge of implementing unit-charges in multifamily dwellings. The problem encountered is that landlords traditionally manage the disposal expenses, yet to reduce waste generation, tenants must be made to face the true costs of their own disposal behavior. It was suggested by some participants that landlords of multifamily dwellings are the most appropriate people to be responsible for managing waste collection charges among tenants, for example, by selling authorized disposal bags to them. Despite this difficulty, it was stated that high-density urban housing is likely to have a very concentrated waste stream, potentially well suited to recycling. Nevertheless, it was noted that in Seattle it has been difficult to get a competitive bid to provide recyclables collection from multifamily homes at below the avoided cost of landfilling.

e. Common Impediments to Unit-Based Charges

It was agreed that the practice in most cities is not to charge at all for garbage collection services. To move towards unit-charge based systems can be difficult, and some sort of catalyzing event may be needed. Dealing with private haulers was also a topic of interest. One participant commented that it is difficult to get private haulers to change to a unit-charge system or to require recycling when customers can easily switch to another hauler. However, another commented that cities should make unit-charges part of their franchise agreement. Competition can also work in a positive way, it was noted, as in Virginia, where haulers have begun competing with each other for the provision of unit-charge services.

f. Political Factors

One participant commented that even in relatively rural areas there is growing citizen pressure to initiate recycling and volume-based rates, forcing politicians to address the issue. Nevertheless, it was stated that in many communities unit-charge systems will not be possible. A rural Alaskan community, it was noted, with adequate land for cheap MSW landfilling recently voted against a unit-charge system. Regional concerns play a big role due to Federal policy. EPA deference to states on MSW management results in individual states having to be very concerned with the actions of their neighbors. Most states are not likely to implement strict regulations in isolation.

g. Federal Role

It was widely agreed that the difference between cities, in terms of MSW management goals, population, and history of management, makes a national policy or Federal regulation inappropriate. There is room for a Federal role, however, in serving as a clearing house for information on unit-charge systems, so that local communities can better assess for themselves the potential of these systems for their specific conditions.

SESSION II: MARKET MECHANISMS TO ENCOURAGE RECYCLING

INTRODUCTION: Robert N. Stavins, Assistant Professor of Public Policy, John F. Kennedy School of Government, Harvard University

The first session of this workshop covered how reliance on unit pricing for MSW management and disposal -- though not a panacea -- could be an appropriate policy mechanism for some communities. In this second session, we will investigate policy mechanisms that could substitute for, or complement, unit pricing. Recycling is one possible approach for materials which have very high disposal costs, and thus might be appropriate for toxic substances or other materials for which disposal costs are disproportionately high in relation to their volume or weight.

Putting disposal costs aside, the political reality is that recycling is heavily demanded by the public, and viewed as an important element of MSW strategies by many policy makers. By 1989, 26 states plus the District of Columbia had passed some form of recycling legislation, either bans, mandates, or tax incentives. By 1990, the number had increased to 38 states plus the District of Columbia. As more and more states and municipalities have gotten into recycling programs, the supply of recycled materials has outpaced the demand for them. To counter this, several states have enacted or proposed legislation to set recycled-content standards. There have also been calls for an increased Federal role in setting standards. This session will discuss the use of different market mechanisms to promote greater recycling from the MSW stream.

THE APPROPRIATE DESIGN AND USE OF RECYCLING PROGRAMS: Peter S. Menell, Acting Professor of Law, Boalt Hall School of Law, University of California - Berkeley

Before investigating the design of recycling programs one must ask, should recycling - in and of itself -- be a goal of public policy? From an economic perspective, recycling is but one of several means to achieve an efficient mix of waste management options. From an environmental perspective, recycling is *not necessarily* better than other MSW management options. Nevertheless, much of the intuition underlying the growing demand for recycling is on the right track. One need only examine the closing of landfills and the poor structuring of MSW disposal fees, to suspect that recycling may not be occurring as extensively as is economically and environmentally desirable. This is not the same, however, as saying that recycling is the best MSW management option. Rather, recycling must still be considered to be but one of many potential tools, which also include source reduction, incineration, and landfilling. The final blend of policies must be based on an analysis of the costs and benefits of each approach.

In designing a recycling system, the key question may be how best to foster a well-functioning supply of secondary materials. The challenge is to set up some system of incentives that will get the resources -- scattered about in trash receptacles -- into a readily accessible and useable form. Hypothetically, we could encourage recycling by directly

regulating the household waste stream. Imagine a trash check-out system at everyone's curbside where they would be charged the cost of disposal less salvage value. This would provide true price signals to consumers about the costs of collection and disposal of their waste. Such a system is infeasible, yet it suggests important design issues.

Several important features that must be considered in designing practical municipal regulatory systems can be classified as either administrative or household issues. The various administrative features that must be considered include: (1) the infrastructure of the community, its layout and size, and type of housing stock; (2) the technology of regulation -- the type of collection vehicles available, customer billing systems, and central separation facilities; and (3) secondary market availability. Design considerations on the household side include: (1) household behavior (household behavior may not always be the "rational response to price signals" that is often assumed -- charges may need to be made especially visible to affect household behavior); and (2) costs to households (including household time and effort).

Combinations of these design features can meet the needs and circumstances of almost any community. In some cities, central separation and little use of price signals may be most appropriate. In other cities, we might recommend a system with elaborate pricing signals, as in Seattle. There are a range of variables and policy options between these administrative and behavioral factors. Project 88-Round II illustrates the factors each community must consider in light of its own unique situation.

A MASSACHUSETTS CONTEXT ON RECYCLING: Susan Tierney, Secretary of Environmental Affairs, The Commonwealth of Massachusetts

Proposed legislation in Massachusetts seeks to address the demand side of the market for secondary products, an area that has not been adequately addressed in MSW management. Much of the effort to date has focused on the supply side of MSW management, such as banning deposition of certain material in landfills, or proposed requirements for residential and commercial separation of waste. Legislation is beginning to focus on the demand side, by mandating recycled-content standards for packaging. The logic behind these bills is that significant market imperfections may block efficient use of scarce landfill space.

The objective of the proposed packaging bills is to establish a more viable private sector market for recycled goods, thus promoting a more efficient use of our limited landfill and incinerator capacity. One proposed bill would comprehensively address all types of packaging, requiring that packaging contain materials that are at least 35% recycled in Massachusetts, or are recyclable at least five times. Financial penalties against packagers for individuals shipments that violated the rules would be substantial.

There are some obvious problems with these proposals, starting with the fact that they are being instituted at the state level, while a regional focus is really needed. In any event, enforcement of these proposals will require a great deal of government oversight.

Another concern is whether industry will be able to retool in time to meet the proposed deadlines. While these proposed packaging standards are admittedly a command-and-control approach, they place a needed focus on the demand side of the recycled materials market.

RECYCLING CREDITS: Ronald McHugh, Senior Economist, U.S. Environmental Protection Agency

One cost-effective environmental-policy mechanism, which has been already been applied to air pollution problems, may also be well suited to MSW management. With *tradeable permit systems*, the government establishes an overall level of pollution control (or, in this case, an overall level of recycling), and then allots this in the form of permits among firms. Firms which keep their emissions below the allotted level (firms which recycle beyond the required level) may sell or lease their surplus permits (credits) to other firms or use them to offset excess emissions (low levels of recycling) in other parts of their own facilities.

Recycling credits are a policy mechanism which can thus foster *cost-effective* attainment of mandatory content standards. They can do this by allowing the sale and purchase of recycling credits between recyclers and new product producers who need recycling credits in order to meet content standards. Mandatory content standards may be appropriate where there are very high disposal costs for a particular material (and also when improper disposal is a problem). Materials such as used motor oil, tires, and batteries are candidates. Improper disposal is a huge problem; for example, improper disposal of waste oil totals 411 million gallons per year, equal to 36 Valdez spills!

Four bills introduced by Senator Wirth and the late Senator Heinz attempt to force firms to internalize some of the improper disposal costs by making manufacturers responsible for ensuring that a certain amount of the material they produce is recycled. Firms can meet this standard either by recycling themselves or by purchasing a recycling credit. For example, Valvoline has begun to slip-stream recycled oil into the front of their refining process. They also recently bought a re-refinery and are very active in collecting used oil. Under the proposed bills, for every unit of recycled oil they utilize they would gain one recycling credit. Alternatively, firms could buy recycling credits from other firms. Every unit of used oil that is re-refined generates a recycling credit, which can be used -- or sold -- by the owner.

This approach operates on the demand side of material reuse, by increasing the level of reuse of the troublesome material, and decreasing the amount of improper disposal. In the case of waste oil, the result should be a relatively constant demand for the recycled oil credits whether oil prices are high or low. The proposed bills are designed to favor the reprocessing of used oil, versus use of the oil as a fuel, since such use as fuel is thought to be less environmentally sound than reprocessing. To foster re-refining, the bills grant two units of recycling credit for the re-refining of oil, and just one recycling credit for reuse as fuel.

In summary, this approach combines mandatory material recycling standards with tradeable permits. The system can reduce the flow of dangerous materials to landfills and incinerators. In addition to obvious environmental benefits, this will reduce landfill costs by removing the more dangerous materials, also making it easier to overcome NIMBY problems.

RESPONSE: Harvey Alter, Manager, Resources Policy Department, U.S. Chamber of Commerce

Many of the proposals under discussion are looking at the wrong problem. Some obvious examples are policies that mandate separation of wastes, but do nothing about recycling. Another problem is forcing the displacement of regularly recycled commodities by new ones. There is also the risk that, once introduced, recycling standards will escalate from 20% to 30%, then 40% and so on. Finally, proposals that set recycling standards will not directly affect the amount of waste going to disposal. The real problem we should be concerned about is the amount and type of waste that is going to disposal.

Part of the problem is an overemphasis on household generation of MSW. Using the numbers from the Franklin studies, we can see that per capita MSW generation has been increasing steadily, while household generation rates are relatively flat. The increase is due to non-household MSW, and yet most of the policy dialogue is about ways to affect household waste generation. The focus on packaging standards is also misplaced. Packaging as a share of household waste has in fact been declining since 1982. While packaging is still a serious component of MSW (34% by weight and volume), recycled-content standards may actually result in heavier packaging, as packagers struggle to meet the minimum-content standards. Rather, we should promote the use of flexible packaging. Flexible packaging will reduce the entire amount of packaging being generated -- even though it may not be recyclable material.

The amount of recyclable materials in MSW is actually going down, as steel cans and glass bottles have decreased as part of MSW. As this continues, people will not continue to separate out glass and cans. We must look at the large component of household MSW that is paper, and design market mechanisms to increase recycling of paper. Recycling lead-acid batteries and waste oil is being addressed in the wrong way. The main problem is not lack of demand, but regulatory limbo and liability risks. About 80% to 90% of lead-acid batteries are currently recycled, and much of the remainder might be brought out of their garage storage places by "battery amnesty days" and by dealing with the tremendous liability recyclers face. Waste oil is also in regulatory limbo over the question of whether or not it is a hazardous waste.

In the case of used auto tires, the policy proposals are also flawed. Recycling of tires is often seen as the only viable option, while burning them for energy recovery might be a very appropriate use in some situations. Over time, tires will be made of tougher and more durable materials, making recyclability lower. And before we do something like implement "recycled tire credits", we better know what we are going to recycle them to!

Many demand-side policy proposals seek to develop the product first, and then to find a market for it. A more appropriate approach is first to develop the demand pull for a product, and then to develop the new product to meet the recognized consumer demand. There are a lot of opportunities to do this with low grade papers and with materials in the non-household portions of MSW.

DISCUSSION

a. Minimum-Content Standards

Some participants criticized minimum-content standards for newspapers. It is not economically efficient, it was said, to force paper mills to invest in new equipment even though their virgin pulp mill equipment may not be running at full capacity. Further, mandated recycling of newsprint may not necessarily be better than other uses, such as use as fuel.

The use of minimum-content standards for newspapers was said to have been successful in stimulating greater recycled paper production in New England. Another participant commented that the public sector would just as soon have industry participate in setting these standards. Newspapers in Washington state have avoided legislation altogether by establishing goals themselves.

Several participants asked what the "correct" amount of recycled content was, and how it should be determined. They suggested that it was not at all clear why states should be involved in dictating packaging standards to industry. It was countered that although it is difficult to determine the "correct" level of recycling, the marginal cost of extra landfill space is very high, and environmental and natural resources are undervalued. It was suggested that the correct amount of recycling for a municipality can be determined by identifying the tipping fee, considering all subsidized services and environmental externalities, since this figure is the avoided cost of landfilling. In Seattle, the tipping fees are very high and secondary markets are well developed. The recycling target there was said to be about 60%, while about 55% is now achieved.

The incompatibility of recycling standards and source reduction was also discussed. It was commented that in Maine aseptic juice packages have been banned even though they may fit well into the MSW hierarchy in terms of source reduction, as well as energy and material use.

A wide range of policy mechanisms must be used to increase the supply and use of secondary materials. The supply of waste to haulers who will separate is inadequate; there is not a reliable supply of materials for those who are waiting to invest in new industry using recycled materials, and recycled materials are still more expensive than many virgin materials. To address each of these problems states must use a range of policy levers, but Federal recycled-content standards and packaging standards will be inevitable due to the

need for uniformity of standards. It was noted that a similar situation occurred in the case of appliance efficiency, where state to state differences forced Federal action.

b. Recycled Oil Credits

One participant disagreed strongly with the proposal for recycled oil credits. It was said that it would be dangerous for government to try to play refinery engineer by deciding whether one or two credits will be granted based on the particular reuse.

c. Plastics Recycling

Liability was said to be a problem with food grade plastics and recycling. Another participant commented on how PET recycling was a bright example of good market development, and demand for the material was now almost insatiable. Regarding the criticism of policies which favor tire recycling over other policies, one participant commented that the reuse of old tires is a "better and higher use" than burning them for energy recovery.

SESSION III: DEPOSIT REFUND SYSTEMS TO REDUCE LITTERING AND IMPROPER DISPOSAL

INTRODUCTION: Henry Lee, Executive Director, Environment and Natural Resources Program, Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University

Deposit-refund systems have been proposed for use in situations in which the improper disposal of a particular waste poses health, environmental, or aesthetic burdens. The objective of deposit-refund systems is to prevent improper disposal so that costly after-the-fact cleanup is not needed. "Bottle bills" are an existing application of deposit-refund systems in nine states. They were intended primarily to reduce litter, and the evidence indicates that they have done this, but it is not at all clear if bottle bills have been the most cost-effective way to limit litter. This session is intended to explore the application and design of deposit-refund systems for various problem areas.

BOTTLE BILLS: Lynn Scarlett, Vice President, Research, The Reason Foundation

Bottle bills were first introduced in the 1970's, and by 1982, nine states had adopted them. The objective of these original bills was litter reduction, yet now in the 1990's, there is a greater focus on the use of bottle bills as a mechanism to increase recycling. As an example, in 1987, a "bottle processing fee" was introduced in California with a clear focus on encouraging recycling. In order to evaluate the success of existing (and proposed) bottle bills we must ask a series of questions: (1) do they achieve the stated goals? (2) at what costs are the goals achieved? (3) how do program costs compare with other alternatives? and (4) what impact do bottle bills have on the operation of other public policies, such as curbside recycling?

Bottle bill legislation has often had two general goals: litter reduction and increased recycling. Evidence on the impact bottle bills have had on litter reduction is sketchy, but some positive effect is reported almost everywhere. Reported impacts range up to 83% reduction in litter, although it is important to remember that the 70% to 80% of litter that is not bottles will not be affected by a bottle bill. Recycling is probably encouraged somewhat by bottle bills, various studies have concluded, but the jury is still out on the impact bottle bills have on recycling in comparison with other types of policies.

Bottle bill operation costs often appear to exceed the scrap value of materials collected. A rough estimate for a program with a \$0.10 deposit per bottle is that collection costs can range from as high as \$6,065 per ton down to \$544 per ton for glass. In contrast, curbside collection programs are usually in the range of \$100 to \$200 per ton. The cost effectiveness of bottle bills in terms of litter reduction is poor. A 1% litter reduction through a bottle bill costs from \$2 million (Iowa) to \$25 million (New York), according to a Keep America Beautiful study. In contrast, a litter reduction program in Washington cost \$860,000 for a similar 1% decrease, and \$225,000 in Texas.

The impact of bottle bills on curbside programs is a concern to many municipalities. A bottle bill effectively removes the high value items from the waste stream. In one study, aluminum cans accounted for 2% of recycling material collected by weight, but 45% of revenues generated. Having a bottle bill may drive up the costs of a curbside program by as much as 50%, according to a Franklin Associates study in Vermont and New York.

DEPOSIT-REFUND SYSTEMS: Bradley Whitehead, Management Consultant, McKinsey & Company

Certain waste materials can have very negative human health and ecological impacts when improperly disposed of. In these cases, deposit-refund systems can play a role to stop the illegal disposal of dangerous wastes. A deposit-refund system can also keep certain materials out of MSW, when landfills and incinerators are ill-equipped for them. The types of waste that might be good candidates for deposit-refund systems include: (1) lead-acid batteries, where there is potential for ground-water contamination if landfilled, or air pollution if incinerated; (2) used lubricating oil, which can contaminate both ground and surface water sources; (3) vehicle tires, which pose both environmental and aesthetic problems; and (4) industrial solvents, which have implications for both air-pollution emissions and water contamination.

The mechanics of a deposit-refund system start with the imposition of a deposit on the material or product in question. The deposit can be imposed on the material as it enters either the production or the distribution process, depending on the goals of the policy. The deposit should theoretically reflect the cost to society of improper disposal plus any program administrative costs. As the material flows through the marketplace, the deposit follows along within its price and at a final collection center, one of three things can happen: the collection center can sell the material for recycling, store the material in anticipation of improving markets, or dispose of the material in a proper way and receive the refund back from the government.

The advantages of a deposit-refund systems are several. Such systems are appropriate where the incidence and consequences of improper disposal are high. Deposit-refund systems can require less monitoring than a manifest system, as is used with hazardous wastes (under RCRA). Deposit-refund systems are also self-policing due to the financial incentive to turn in the material for the deposit. Finally, they discourage losses in the production process, while encouraging the search for less harmful substitutes.

Deposit-refund systems are not without limitations. In monetizing the particular material, the deposit-refund system requires a complex administrative system. In the case of lead-acid batteries, for example, thousands of collection centers might be required. There is also the chance that unintended signals could be sent to producers, causing them to switch to unregulated -- but potentially more dangerous -- compounds. Certain products may also be subject to tampering, such as through the dilution of used motor oil; this would necessitate a more thorough monitoring system. The size of the deposit has political and practical complications, as well. The deposit must be of adequate size to change consumer

behavior, but not too large to be politically infeasible. There is also an equity concern; the carrying costs -- or the money sunk in the deposit until redemption -- may represent an unfair burden on some income groups. Finally, use of deposit-refund systems may be limited at the state or local level, because of the opportunity for cross-border arbitrage.

The usefulness of deposit-refund systems can be seen in comparison to a recycled-content standard. The direct effect of a recycled-content standard is to reduce the flow of waste that needs to be disposed of. The indirect effect may be less improper disposal -- but not necessarily so. In contrast, a deposit-refund system will have the direct effect of reducing the level of improper disposal. The indirect effect may be to increase recycling (since materials are aggregated together). The choice between these two approaches must be based on an assessment of the true problem to be dealt with, the likely strength of secondary impacts, administrative complexity, cost of compliance, and ease of enforcement.

One practical application of deposit-refund systems could be to prevent the improper disposal of waste lubricating oil. A deposit-refund system would encourage all consumers of lubricating oil, both professional and do-it-yourself mechanics, to collect and return waste oil in order to receive their deposit refunds. In contrast, proposals for a recycled-content standard for new oil might be less effective at limiting improper disposal. A recycled-content standard for oil refining would require a certain number of recycled oil credits for each unit of new oil produced. The credits could be generated by anyone who collects and reuses waste oil; these credits would be tradeable. To produce new oil, a refinery must then either recycle a certain amount of oil, or obtain the credits on the market.

On the surface, a recycled-content standard for oil would seem to encourage proper collection and reuse of waste oil, thus limiting improper disposal. However, the most difficult to collect waste oil -- that generated by do-it-yourself mechanics -- might go unaffected. Note that 14% of the automobile oil market is do-it-yourself mechanics; their waste oil accounts for fully 50% of the improper oil disposal problem. Under a recycled-content standard, oil recyclers will only go after the waste oil that can be economically collected; do-it-yourselfers will probably be the least economic source of waste oil.

The end result of the recycled-content standard may not be much of a reduction in improper disposal. A deposit-refund system, on the other hand, would appeal directly to all generators of used oil. The final choice of a policy must therefore be based on an assessment of whether the problem is one of improper disposal (deposit-refund systems preferred) or low levels of recycling (recycled-content standard preferred).

RESPONSE: Jean Statler, Vice President, Communications, Council for Solid Waste Management

The bottle bills of the 1970's have not kept pace with MSW management problems and solutions of the 1990's. We now have sophisticated curbside programs, private haulers with recycling experience, and industry groups that spend a lot of time working together with

communities to develop recycling solutions. The older legislation has not adapted to these changing circumstances.

The original bottle bills have several faults. First, they put the wrong people into the garbage business, namely beverage retailers. Second, they only deal with a very narrow slice of the waste stream, while consumers now demand more expansive recycling. Third, bottle bills remove some of the high value items from the waste stream, hurting the economics of curbside recycling. On the other hand, a positive outcome of bottle bills is the very clean and uncontaminated stream of waste products that is collected. The level of contamination is usually less than that in curbside programs.

The political reality of the day is that even though the economics of recycling are not always sound, there is strong public demand for recycling. This part of the workshop could very well have been called "Market Mechanisms to Meet Community Demands for Recycling." From the viewpoint of a private MSW hauler or industry association, there is not the time to sit down and methodically work out the economics of recycling -- it is simply demanded by many communities.

DISCUSSION

a. Bottle Bills

The participants generally expressed reservations regarding bottle bills, while recognizing that there may be significant public demand for them. Several people commented that in places where curbside collection is not economical, a bottle bill may prevent littering and recover a steady stream of secondary materials. It was said that bottle bills actually shifted costs away from municipalities and on to retailers and distributors and consumers. One participant disagreed that curbside programs are best suited for higher density urban areas, and claimed that bottle bills may be needed in rural areas. It was noted that in many rural areas, there are some good recycling programs running. Another participant commented that Seattle probably gets as much glass and aluminum from curbside as it would get with a bottle bill.

b. Deposit-Refund Systems

It was widely agreed that deposit-refund systems were useful for wastes such as batteries or oil, where improper disposal has a very high social cost. The usefulness of a deposit-refund system is greatest when the alternative costs of cleanup are severe. For example, a deposit-refund system for waste oil is very appropriate, given the costs of groundwater remediation, but a deposit-refund system to limit litter from beverage bottles may be less beneficial since cleanup is relatively cheap. In the context of deposit-refund systems, it is important to consider who is best suited to be in the waste-collection business. Automobile lubrication services may be quite suited to collect waste oil, given their tanks and equipment; in contrast, grocery retailers may be relatively poorly suited to collect waste bottles and cans.

It was noted that a deposit-refund system on batteries seems to be working in Washington State. That state also has an up-front fee on automobile tires that is used to fund research on the use of scrap tires. In addition, they also have a fee on solvents that is channeled back to local governments to subsidize household hazardous waste collection. In the case of waste oil disposal, it was stated that there are a wide range of options available besides a deposit-refund system to address the 25% of waste oil that is improperly disposed of. These could theoretically include greater provision of public information via labelling, or a command-and-control approach such as banning do-it-yourself oil changing.

c. Politics and Law

It was widely agreed that new policies must be considered in the context of other regulated sectors. Some existing legislation actually restricts the recycling of certain items. An example is industrial solvents, which are in some cases restricted (under Subtitle C of RCRA) from recycling. Many lead-acid batteries are exported to Mexico for recycling, a practice which may be restricted under proposed U.S.-Mexico free-trade agreements. Recycling of waste oil was said to be impeded by RCRA rules about hazardous wastes.

It was commented that the political system forces politicians to develop egalitarian policies, such as equal city-wide MSW fees or equal national standards. Others commented that fairness, not equality, should be the key consideration. In designing MSW policy, it is fair to have everyone face the true cost of their own MSW disposal, however unequal the costs may be.

d. Private Waste Haulers

There has been a huge growth in curbside recycling in the past two years -- even though it may not always be profitable. One participant commented that it has been public demand and the need to maintain market position that have forced private haulers into the business. While most private haulers would agree that curbside programs are better than bottle bills, it was noted that they must be prudent in expressing their opinions. From the point of view of the private disposal company, it was said that there are great benefits to the separation of problematic wastes. If materials such as batteries and oil are removed from MSW, the MSW will be less hazardous, making the siting of disposal facilities less difficult.

SUMMARY: Robert N. Stavins, Assistant Professor of Public Policy, John F. Kennedy School of Government, Harvard University

The field of municipal solid waste management is complex and requires well crafted policies. There are several key points which came out of this workshop that should be reiterated. First, consideration of any policies must begin with a clear identification of the problem being addressed, whether it is littering, lack of landfill and incinerator capacity, or illegal disposal. Also, it is necessary to identify clearly the actual goals of the MSW management; some possible goals could include aesthetics, sound financial policy, or health protection at minimum cost. Finally, a portfolio of waste management strategies is needed.

There is often substantial confusion between means and ends in the MSW management field. Increased recycling, for example, may well be a valid means of achieving some legitimate waste management goals. But recycling *per se* ought not to be -- any more than landfilling *per se* -- seen as a general objective of waste management policy. The legitimate objectives of MSW management should include protecting human health and ecological values while providing sufficient solid waste management at minimal cost. The question for policy makers is which specific mechanisms within the wide portfolio of approaches should be used?

When there is an imbalance between the supply and demand for MSW management services, incentive-based policies might be part of the key to truly effective solutions. Incentive-based policies work by focussing on providing better pricing signals to consumers of MSW services so that they face the true social cost of their generation and disposal behavior. In implementing an incentive-based approach, accurate unit pricing of curbside collection and disposal must be the first step in most situations. MSW management service cost must be accurately revealed to consumers. Design of a more complete system must be contingent on consideration of demographics, traditions, and geography of individual communities. Fully developed unit-pricing systems might feature either volume-based or weight-based billing to individual households. Unit pricing, however, is not a panacea, because communities vary greatly and a unique approach must be developed for each.

As a partial substitute for a pricing approach or a supplement for products with particularly high disposal costs, recycling and recycled-content standards can be a useful means of achieving legitimate waste management goals. On a broader level, the implementation of recycled-content standards along with a tradeable-permit approach can achieve the objective at lower aggregate cost to society.

Where improper disposal of waste is a concern for human health and ecological reasons, as it is with a small segment of the waste stream, then an appropriate incentive-based approach could be deposit-refund systems. Application to bottles and cans has been common, yet the consensus today seems to be that it is, at best, problematic in this use. On the other hand, for lead-acid batteries or other wastes with health or environmental risks, there is still great potential. A remaining issue is whether to apply deposit-refund systems at the state or Federal level.

Incentive-based approaches also have potential in the siting of new facilities. Project 88 -- Round II describes ways that these approaches can be used to assist in NIMBY problems, be they for landfills, incinerators, or recycling operations.

Overall, the municipal solid waste field is a complex mix of environmental, social, financial, and health problems. There is no "silver bullet solution" to all problems, and the solution for any problem and for any one location will be distinct from all others. Incentive-based approaches offer a new set of tools to solve municipal solid waste management problems. The challenge is to identify appropriate policies for each unique situation.

INCENTIVE-BASED POLICIES FOR MUNICIPAL SOLID WASTE MANAGEMENT
A Project 88/Round II Workshop for State and Local Government

John F. Kennedy School of Government
Harvard University
Cambridge, Massachusetts
May 16, 1991

8:15 am Continental Breakfast

8:50 am Welcome: **Ashton B. Carter**
Director, Center for Science and International Affairs
Kennedy School of Government, Harvard University

9:00 am Overview: **Robert Stavins**
Kennedy School of Government, Harvard University

9:20 am Presentation: **Municipal Solid Waste: Dimensions of the Problem**

Marjorie Franklin
Franklin Associates, Ltd.

9:45 am Session I: **Improving Price Signals -- Unit Charges for Collection & Disposal**

Chair: **Tony Gomez-Ibanez**
Kennedy School of Government
Harvard University

Speakers: **Haynes Goddard**
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Diana Gale
Director, Solid Waste Utility Division
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Respondent: **Douglas Ziesemer**
Assistant Commissioner, Solid Waste
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11:15 am Coffee Break

Incentive-Based Policies for Municipal Solid Waste Management Agenda (Continued)

11:30 am **Session II: Market Mechanisms to Encourage Recycling**

Chair: Robert Stavins
Kennedy School of Government
Harvard University

Speakers: Peter Menell
University of California School of Law

Susan Tierney
Massachusetts Secretary of the Environment

Ronald McHugh
U.S. Environmental Protection Agency

Respondent: Harvey Alter, U.S. Chamber of Commerce

1:00 pm Lunch

2:15 pm Session III: Deposit-Refund Systems to Reduce Littering and Improper Disposal

Chair: Henry Lee
Kennedy School of Government
Harvard University

Speakers: Lynn Scarlett, The Reason Foundation

Bradley Whitehead, McKinsey & Co.

Respondent: Carol Bell, Rhode Island
Department of Environmental Management

3:45 pm Summary Remarks: **Robert Stavins**
Kennedy School of Government
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4:00 pm Adjourn

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