

Policy Brief: Correcting for Landfill Externalities

Overview

The use of landfills as a means of solid waste management has a variety of adverse environmental and social impacts that are not incorporated into the price of landfilling. When such external costs are not borne by those seeking to dispose of solid waste, the cost of waste disposal is underpriced and, therefore, overproduced. Put another way, landfills impose environmental and social costs for which its users are not charged and, as a result, landfills are overused while more environmentally sound alternatives are underused.

Estimates of those total external costs range from more than \$5 per ton to nearly \$77 per ton, with the most recent estimates placing the costs between \$5.38 and \$8.76 per ton. Those costs are felt varyingly at local, regional, and global levels.

An incentive-based approach useful to address this disparity is a tax set equal to the external marginal cost of solid waste disposal. Such an approach, known as a Pigovian tax, forces landfill prices to be optimally set and causes each cost-minimizing entity, public and private, to internalize all social costs of disposing solid waste and adopt efficient solid waste management systems.

A share of the proceeds from such taxes can be passed along to communities that bear those existing external costs as a consequence of hosting a landfill within their borders and a portion could be channeled to those entities engaged in activities that reduce the creation of those costs. In other words, entities that recycle, thereby reducing landfill-related external costs, should be subsidized through such tax or surcharge revenue.

External Costs of Landfilling

Externality theory can make an important contribution to the design of public policies to protect the environment. First described by British economist A.C. Pigou, when costs are externalized to society, resources are misallocated. It has been widely recognized that the source of basic economic principles of environmental policy may be found in the theory of externalities. In its most basic form, when environmental impacts or externalities are not internalized, prices are distorted, creating incentives for environmentally harmful practices. In other words, price is not an optimal policy unless it reflects the full social marginal costs.

Externalities associated with solid waste management may include groundwater contamination (or risk thereof), air pollution and greenhouse gas emissions, and neighborhood disamenities such as malodors, noise, visibility, traffic, dust, litter, and road damage. Such impacts may be global and/or local and are dependent upon individual landfill characteristics that vary upon a number of parameters including, but not limited to, location, size, and population density.

Government intervention to correct for externalities has often taken the form of regulations to require or prohibit certain behaviors and to require environmental safeguards. Perhaps, the most well known example dealing with solid waste externalities is the Resource Conservation and Recovery Act (RCRA) of 1976, which greatly expanded the role of the Federal government in the field of solid waste disposal. Through RCRA and its subsequent amendments, Congress and the United States Environmental Protection Agency (EPA) established environmentally acceptable practices for landfills across the nation. Congress developed these regulations to minimize environmental impacts and protect human health.

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Less frequently utilized are policies that cause prices, through taxes or surcharges, to account for full social costs. Such an approach is known as a Pigovian tax. Solid waste surcharges reflect the latter approach.

An incentive-based policy approach potentially useful to governments is a tax or surcharge set equal to the external marginal cost of solid waste disposal. Once the tax is set optimally, each cost-minimizing entity, public and private, internalizes all social costs of disposing solid waste and can be expected to adopt efficient solid waste management systems. Such decisions would be considered efficient as long as the landfill tax is set correctly. The landfill tax is efficient if set equal to the external marginal cost of solid waste collection, transportation, and disposal. Since the external marginal cost may vary, the optimal landfill tax or surcharge could also be expected to vary.

Existing Studies of External Costs

A number of existing studies have sought to identify the external costs associated with landfilling. Those studies include the following:

- Davies and Doble (2004) estimate the external marginal cost attributable to greenhouse emissions is \$3.27 per ton for landfills without energy recovery and \$2.22 per ton for landfills with energy recovery.
- Defra (2004) estimates the local disamenity cost (odor, visibility, and general disamenities) to range between \$3.05 and \$4.39 per ton.
- Davies and Doble (2004) estimate the costs of waste transportation to landfills (congestion, air pollution, and the increased probability of road accidents) to be \$0.51 per ton for urban landfills and \$1.69 per ton for rural landfills.
- (Kinnaman, 2005) total external costs of solid waste transportation and disposal total to between \$5.38 and \$8.76 per ton, and argues that those costs should be translated into landfill taxes levied at various levels of government depending upon the nature of the external costs. In addition, Kinnaman acknowledges that advocates of recycling suggest the manufacturing of goods using recycled inputs generates less air and water pollution than manufacturing using raw virgin materials and that the optimal landfill tax should also reflect this effect.
- Fullerton (2002), in examining excise taxes on municipal solid waste, posited a total external cost per ton in Michigan of between \$12.40 and \$76.73, which included both local and global external costs. Identified costs were dependent upon specific landfill characteristics and location and did not include aesthetic costs.
- Stone and Ashford (1991), in a Massachusetts study, provide an external cost estimate of \$75 per ton.
- The Tellus Institute (1991) estimated external costs to be \$67 per ton for lined landfills with leachate collection systems in California.

Discussion on Externalities

Both theory and existing literature yield two distinct conclusions. First, external costs, beyond those already accounted for by federal and state environmental regulations, likely vary

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significantly based on landfill characteristics and the characteristics of the area in which the landfill is sited. Second, external costs may be borne locally, regionally, and globally.

Those conclusions have significant ramifications. The most obvious ramification is that an across-the-board surcharge, imposed without regard for site-specific characteristics, is likely neither accurate nor equitable. Because unaccounted for external costs may vary dramatically from facility to facility, based on the host of factors, attempts to account for those costs via surcharges should be conducted with regard to specific site characteristics. By accounting for the various parameters associated with both the subject facility and the host community, surcharges can be applied that are equitable and accurate, and therefore, efficient.

To be consistent with both theory and empirical data, surcharges should be developed on a site-by-site basis or based on broader facility classifications that take into account common characteristics of facility size, type, design, and operational parameters, as well as host community characteristics such as adjacent land uses, local hydrology, population density, local infrastructure, etc. This approach avoids a one-size-fits-all technique and improves the likelihood that surcharges will not undercharge or overcharge for any external costs not already accounted for through environmental regulations. It also allows for that portion of external costs associated with local conditions, particularly disamenity costs and groundwater threats, to be more accurately assessed.

The second significant ramification deals with the fact the external costs may be local, regional, and global. To a large degree, local costs may already be accounted for through host community agreements. However, since Michigan state law neither requires such agreements nor allows local communities to require such agreements, it is unclear how the existing regulatory system would ensure that locally borne, external costs are accurately accounted for and passed along to the community that bears those costs.

The remaining portion of any surcharge revenue (that portion related to regionally or globally borne, external costs) could be channeled to those entities engaged in activities that reduce the creation of those costs. In other words, entities that recycle, thereby reducing landfill-related, global external costs, should be subsidized through the non-local portion of the surcharge revenue. A variety of approaches to subsidize recycling and waste reduction activities via surcharge revenue have been suggested. The most direct methods appear to be a subsidy, on a per capita basis, to municipalities with recycling and waste reduction programs, or on a per ton subsidy to those entities, public and private, that are engaged in recycling.

References

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