

MISSING THE MARK(ET) IN SITING HAZARDOUS WASTE FACILITIES

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Siting a hazardous waste facility under current state and federal regulatory regimes involves an extensive process of public examination that few facilities survive. In a nationwide survey conducted in 1987, New York's Legislative Commission on Toxic Substances and Hazardous Waste found that of eighty-one recent siting applications for commercial firms that treat, store, or dispose of hazardous waste (TSDs), thirty-one had been denied or withdrawn, thirty-six were still under review, and fourteen had received permits under the Resource Conservation and Recovery Act (RCRA).¹ Of the fourteen approved permits, however, six had not been implemented because of market circumstances or reversals during judicial review.² State hazardous waste officials surveyed in 1987 listed public pressure as the number one reason for the rejection of commercial TSD sitings. They reported that public opposition had stopped fifty-two percent of the commercial facilities that were rejected. (The next most likely reason for failure was technical design problems, which accounted for thirty-eight percent of the siting rejections.)³ Neighborhood opposition to facilities that treat hazardous waste springs from a variety of public concerns: threats to property values, odors and nuisances posed by the facility's operation, and health and safety concerns about accidental releases of hazardous waste, such as local groundwater contamination from a dump site.⁴

Ronald Coase's often cited article, *The Problem of Social Cost*, provides one explanation for why a firm that generates pollution would have to consider the negative effects of its emissions on surrounding neighbors.⁵ Consider a world where property rights are fully defined, transaction costs are zero, and people enjoy the right to be free of pollution. In such a world, a firm choosing its location realizes that it will have to pay surrounding neighbors for the "right" to pollute. In trying to minimize its future liabilities for pollution in its location decision, the firm will take into account the physical and demographic charac-

teristics of the surrounding neighborhood that will influence the "cost" of the externalities generated by the firm: the number of people affected, local incomes, vulnerability of property values, and residents' willingness to pay for environmental amenities. The firm will act as if it were calculating the potential damages associated with each of its locations, for it knows that once it locates and generates pollution it will have to negotiate with and pay compensation to each affected party. Thus, holding other factors constant, the ideal location for the firm will be a liability minimizing neighborhood characterized by low population densities, incomes and property values.

Coase never intended his arguments in *The Problem of Social Cost* to be a description of how the world actually operates. He rather intended his model to lead people to ask why actual outcomes, such as the location of firms generating pollution, diverge from those predicted in a world of zero transaction costs.⁶ Yet the spirit of the Coase Theorem lives on in proposals to ease the impasse in siting hazardous waste facilities by creating an explicit market.⁷ Under such proposals, firms would offer communities willing to host commercial TSDs explicit compensation to offset the perceived dangers and potential stigma associated with hosting such a facility. Communities would announce through a negotiation and bidding process the amount of compensation they would demand in order to host the waste site. Such compensation would take the form of specific donations by the firm to the community, profit shares in the dump, tax revenues linked to the quantity of waste handled, or provision of services to the community. The intended result: the firm locates where its damage is the least because that is where the compensation figure announced by the community will be the least. As of 1987, at least fourteen states had instituted formal mechanisms to provide

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communities with economic incentives to host such noxious facilities.⁸

Though the negotiation and bidding strategy may appear to solve the problems created by an absent market in location rights, the real world of politics will still fail to replicate the outcomes predicted by the Coase Theorem for at least three reasons. First, communities vary in the extent to which their residents express their political opinions through collective action. Opposition to the potential siting of a commercial hazardous waste facility is thus a product of two factors: the potential compensation that individuals in the community would demand in order to accept a TSD, and the compensation demand actually expressed by the residents' collective action. Creating local opposition groups to stop a facility siting, lobbying company officials, and participating in forums such as county zoning boards or state siting commissions are actions residents can take to raise the potential location costs of a firm. Thus, to the degree that communities vary in their ability to overcome the problems of collective action, such as the tendency of individuals to sit back and "free ride" on the efforts of others, the amount of opposition expressed to a firm's siting depends a great deal on the political skills and abilities within the respective communities. Second, the degree to which the public officials involved in the negotiating process actually translate the interests of their constituents into compensation demands may result in a divergence from the Coasian outcome. Finally, the failure of the relevant political markets to overlap with the economic markets involved in the operation of commercial hazardous waste facilities may mean that the political community that demands the least compensation may not be the location where the firm generates the least externalities.⁹

POLITICS AND SOCIAL COSTS

There are many problems associated with translating the metaphor of the auction market into public policies in which communities compete for the compensation offered for hosting a hazardous waste facility. Many of these problems arise because, while individuals have preferences, "communities" do not. If a firm could negotiate costlessly with each of the individuals threatened by the risks of pollution associated with a hazardous waste facility, then the Coase Theorem's

predictions would hold true. In the actual siting process, however, translating the interests of the residents of a community into compensation demands from a firm involves action through the political process. Because neighborhoods vary in the degree to which they engage in collective action, a locating firm, in addition to considering the potential environmental damages that would be generated by its facility, will also take into account whether a community can successfully engage in collective action to exercise its property rights to compensation. Given the importance of public opposition in determining the success of a siting proposal, firms should consider the potential for political activity as a separate factor in their decisions as to which areas to target for proposed facilities.

Among the clearest evidence of the importance of the potential for collective action in siting decisions of LULUs ("locally undesirable land uses") is a report prepared in 1984 for the California Waste Management Board.¹⁰ As part of a multivolume study of how to locate waste-to-energy plants in the state (prepared at a time when only 3 of 29 planned publicly-owned waste-to-energy facilities had progressed to the siting phase of the project because of public complaints), the California board commissioned a report entitled "Political Difficulties Facing Waste-to-Energy Conversion Plant Siting." Excerpts from the report reveal that a neighborhood's likelihood of engaging in political opposition has become an explicit siting factor:

A great deal of time, resources, and planning could be saved and political problems avoided, if people who are resentful and people who are amenable to Waste-to-Energy projects could be identified before selecting a site. If this information was available, facilities could be placed in areas, if technically feasible, where people do not find them so offensive.¹¹

Since the 1970s, political criteria have become every bit as important in determining the outcome of a project as engineering factors. The introduction of political criteria significantly complicates the task for the simple reason that political criteria

often are at odds with engineering concerns. The best site in terms of financial feasibility and geologic suitability may very well be the most troublesome politically.¹²

Another problem in expressing the aggregation of individuals' compensation demands through the political process stems from the relationship between representatives and their constituents, a principal-agent relationship much like that between management and shareholders. In the bidding among communities, it is uncertain whose compensation demands will be announced by public officials and who actually will receive the benefits. In highly competitive districts where representatives' actions are policed by party competition, representatives may speak for those constituents whose support is essential to reelection, who may or may not be the residents affected directly by the siting of the hazardous waste facility. In areas where electoral scrutiny is more lax or barriers to entry by political challengers are steep, the compensation provided by noxious facilities may flow directly to the public officials in the forms of political donations or contracts for consulting and legal work.

Even if representatives are fully attentive to the interests of their constituents, the failure of political markets to overlap perfectly with the economic markets involved in siting hazardous waste facilities represents a problem for envisioned siting competitions among communities. One phenomenon evident in the location of NIMBY ("not-in-my-backyard") facilities is the tendency of policymakers to place them on the extreme borders of their localities so that the potential harms from their operation fall in large part on residents who are not their constituents. A more subtle externality problem may occur when the political action of one group of residents in an area ends up "protecting" neighborhoods willing to host a facility. Consider the case where those residents immediately surrounding a proposed site are willing to accept compensation for the location of a waste facility. Other residents of the county who are not physically threatened by pollution from the facility, but who are concerned about environmental protection in general or the stigma of being a regional dumping ground, may actively oppose the siting. If the residents who are directly affected are unable to organize as well as less

affected residents, then political action may block the facility from locating in the area where it generates the fewest externalities.

EVIDENCE OF COLLECTIVE ACTION

Testing theories about the relationship between neighborhood characteristics and facility location is often difficult, for the question emerges whether a facility's operation in an area has changed the characteristics of the neighborhood. For example, when a hazardous waste facility is located in a low-income area, is this because that is where property values and compensation demands were low? Or is this because a firm located in the area, property prices dropped as the environment became degraded, and low income residents willing to trade environmental quality for reduced housing prices moved into the neighborhood? One way to avoid this problem of separating the effects of a facility on a neighborhood is to look at planned expansions of hazardous waste facilities. The facilities may not have announced their expansion plans, so that property values will have not reacted to the potential hazards posed. Using the Freedom of Information Act, I obtained the results of a 1987-EPA survey of firms that treat or dispose of hazardous waste that included firms' planned changes in capacity for 1987-1992.¹³ This allowed me to test theories about the location of NIMBY facilities by exploring the following question: of those counties that currently have commercial hazardous waste facilities, what factors determine whether the county is targeted for a net expansion in processing capacity in firms' plans for 1987-92?

Economic theories of firm location indicate in part what factors a commercial hazardous waste facility considers in the decision of whether to expand in a given area. These factors include input costs such as land prices, the relative demand for hazardous waste treatment by local facilities that generate such pollution, and the capacity of its competitors to supply waste processing services. In addition, the firm should consider the compensation demands arising from its location in a particular neighborhood. These can be calculated in part as the expected costs the firm would face from suits arising out of liability for damage to physical structures and effects on human health.

The firm may also take into account the demographic variables associated with environmentalism, so that areas where people place a high value on environmental amenities are avoided. Thus the higher the income, education levels, and property values in a given area, the less likely a firm concerned about potential compensation for pollution would be to locate in that area. Since expressing opposition to firm siting entails action through the political process, the firm would also consider the potential for collective action to translate compensation demands into effective opposition to the firm's siting.

In order to test the location theories outlined above, I examined how the probability of a county's selection as a site for capacity expansion varied as a function of the current local hazardous waste processing capacity, the generation of hazardous waste by facilities in the area, and the characteristics of the county associated with higher compensation values (such as resident incomes, average house values, and education levels). To capture the influence of variations in political activity among areas in the site selections of the commercial waste processors, I added another variable to the model of firm location: the percentage of county residents eighteen and older who voted in the 1980 presidential election. This variable was included not because firms would necessarily estimate the voter turnout in areas they targeted for facility expansion. Rather, the variable is meant to proxy the potential for collective action, on the assumption that areas which the firms would consider especially active in politics would thus be identified in the model because they would also tend to be areas with higher voting rates.¹⁴ Of the 156 counties in the EPA survey that had commercial hazardous waste facilities in operation in 1986, seventy-two were targeted for net expansion in processing capacity in the firms' plans for 1987-92.

Analysis of the determinants of the firms' capacity decisions reveals the influence of both economic and political factors. In the models estimating the probability that a county with commercial hazardous waste processing capacity in 1986 would be selected for additional capacity construction in 1987-92, the higher the current capacity surplus (defined as the difference between the maximum available capacity for process-

ing hazardous waste and the amount of capacity actually utilized) in the area, the less likely are firms to plan additional construction in the area. Similarly, the greater the amount of manufacturing in the county (and hence the greater potential for waste generation and the demand for waste processing services), the higher the probability that an area would be selected for capacity expansion. Most striking, however, is the result that even after differences in area incomes, education levels, and property values are taken into account, the higher the voter turnout in the 1980 elections, the lower the likelihood that commercial hazardous waste firms would target an area for expansion. When the question of which factors lead to a net reduction of commercial hazardous waste processing is examined, a similar result emerges. The higher the voter turnout rate in an area, the more likely that firms within the county will reduce their processing capacity. These results indicate that firms do consider the potential for collective action in deciding where to operate. The higher the potential for political opposition in a given community which today has a commercial hazardous waste facility in operation, the lower the odds that the community will be selected as a site for additional processing capacity, and the greater the chances that firms will decide to shut down processing capacity in the area in the future.

The influence of potential political opposition on the capacity plans of commercial hazardous waste facilities for 1987-92 marks a change from the common law siting regime in operation during the 1970s. Prior to the emergence of Love Canal (1978) and the passage of the Superfund Act in 1980, the dangers associated with commercial facilities from groundwater contamination were less appreciated by the public and harder to remedy through the courts because of the difficulties in pursuing toxic torts claims. As public perceptions of the dangers posed by waste facilities increased, however, political opposition became more of a determinant in the siting decisions of firms. If one compares the probability that a county would be selected in the 1970s as a site for a new hazardous waste facility with the probability that the county would be a target for net capacity expansion in the later era, the changes reveal the increasing importance of Coasian compensation demands and political opposition in the siting process. The greater the

resident incomes and education levels in a county, the lower its probability of selection for hazardous waste processing capacity in the late 1980s, relative to the regime of the 1970s. Similarly, the higher the voter turnout in the area, the lower the probability the county would be chosen for capacity expansion in 1987-92, relative to its selection probability in the 1970s. Thus, hazardous waste firms during the 1970s selected their locations with less regard to compensation demands and political opposition than in the current era of greater regulatory and public scrutiny.

CONCLUSION

If the world truly resembled the land of zero transaction costs described in Coase's *The Problem of Social Costs*, then the location of commercial hazardous waste facilities would be much simpler. Other things being equal, the firm would end up locating where the damages from its pollution were the least because that is where the negotiated compensation demands would be the least. Yet, since opposition to firm location and expression of compensation demands come through the political process, differences in neighborhoods' abilities to organize and engage in political activity become important. As the evidence from the siting plans of commercial hazardous waste facilities for 1987-92 indicates, firms do consider variations in the potential for political opposition in their selection of where to expand or reduce hazardous waste processing. Thus, firms may end up locating where the opposition expressed is the least, though this may not be where the damage of their externalities is the least.

Current state statutes and proposals for changes in the siting process often aim at making property rights more explicit through specific procedures of negotiation and compensation in the siting of NIMBY facilities. The process of counties battling in the siting process is portrayed as a market for location in which the firm ends up choosing the site where the sum of its economic and political costs are the least. The operation of such a market, however, depends in part on the translation of individual demands through the political process and the concomitant problems of collective action and representation. In the Coasian world, if property rights are fully defined they will flow to their most

highly valued use. In a political world, however, even if rights are fully defined there is no guarantee they will be exercised if their operation depends upon collective action.

1. New York Legislative Commission on Toxic Substances and Hazardous Wastes, *Hazardous Waste Facility Siting: A National Survey 23* (June 1987).

2. Id at 23.

3. G. Stephen Mason Jr., *Closure and Rejection of Waste Facilities*, Hazardous Materials Control 57 (July-August 1989).

4. The EPA generally identifies as a "hazardous waste" a waste which is ignitable, corrosive, reactive or toxic. The Resource Conservation and Recovery Act of 1976 (RCRA) defines "hazardous waste":

... a solid waste ... which because of its quantity, concentration, or physical, chemical, or infectious characteristics may —

(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

(B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Resource Conservation and Recovery Act, 42 USC § 6903(5) (1982). RCRA identifies the criteria the EPA may take into account in identifying and listing hazardous waste: "toxicity, persistence and degradability in nature, potential for accumulation in tissue, and other related factors such as flammability, corrosiveness and other hazardous characteristics." 42 USC § 6921(a) (1982).

5. Ronald Coase, *The Problem of Social Cost*, 3 J L & Econ 1 (1960).

6. Coase describes the misinterpretation of his work:

The world of zero transaction costs has often been described as a Coasian world. Nothing could be further from the truth. It is the world of modern economic theory, one which I was hoping to persuade economists to leave. What I did in *The Problem of Social Cost* was sim-

ply to bring to light some of its properties. I argued that in such a world the allocation of resources would be independent of the legal position, a result which Stigler dubbed the Coase Theorem.

Ronald Coase, *The Firm, the Market and the Law* 174 (U Chicago, 1988).

7. For a theoretical description of community compensation bidding, see Howard Kunreuther, et al, *A Compensation Mechanism for Siting Noxious Facilities: Theory and Experimental Design*, 14 J Envir Econ & Mgmt 371 (1987). For a discussion of state law that includes siting compensation, see Lawrence S. Bacow and James R. Milkey, *Overcoming Local Opposition to Hazardous Waste Facilities: The Massachusetts Approach*, 6 Harv Envir L Rev 265 (1982).

8. New York Legislative Commission, *Hazardous Waste Facility Siting* at 16 (cited in note 1).

9. The problems associated with a community bidding scheme for locating unwanted facilities do not mean that such a scheme should not be adopted. The case for its adoption depends on whether, despite the difficulties outlined in this article, such a proposal would represent an improvement over the current siting process operating in a given state.

10. Cerrell Associates, *Political Difficulties Facing Waste-to-Energy Conversion Plant Siting 1* (1984) (report commissioned by California Waste Management Board).

11. Id at 17.

12. Id at 31.

13. For a full description of the empirical tests discussed, see James T. Hamilton, *Politics and Social Costs: Hazardous Waste Facilities in a Truly Coasian World* (February 1991) (unpublished doctoral dissertation, Harvard University) (on file with author).

14. See Edward J. Walsh and Rex H. Warland, *Social Movement Involvement in the Wake of a Nuclear Accident: Activists and Free Riders in the TMI Area*, 48 Am Soc Rev 764 (December 1983) for evidence that activists in the Three Mile Island area were more likely to report having voted than those who opposed the facility's operation but did not engage in political action to oppose the facility's operation.