

16. Protest, property rights and hazardous waste: a reassessment

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INTRODUCTION

In 1986 we published an article on the hazardous waste siting dilemma in which we identified the ambiguity of property rights as an important factor underlying the failure of siting proposals to get a considered hearing. We proposed that if government clarified who holds the property right to a hazardous waste site by granting prospective host communities veto power, this would create the context for a meaningful decision process. A key part of our proposal was that the community decision should be based on the outcome of a referendum rather than a vote by elected officials. In this chapter we assess the contemporary relevance of our proposal by reviewing the siting experience of the last 15 years. The first section presents the text of our 1986 *American Economics Review Papers and Proceedings* paper. In the second section we discuss two examples of *de facto* property right shifts to an affected public along the lines of our proposal. We also present the economic rationale for discrepancies between the willingness-to-pay measure of economic welfare change and the large willingness-to-accept amounts demanded by the public in these cases. In the following section we review the subsequent siting experience as presented in the literature. Although this literature has largely ignored our property rights analysis, we find that referendums have played a significant role in the few successes in siting hazardous waste facilities during this period. We consider the implications of this finding in our conclusion.

PROTEST, PROPERTY RIGHTS AND HAZARDOUS WASTE

The ambiguity of existing property rights that govern the siting of hazardous waste facilities¹ is an important cause of the stalemate in siting these facilities. What is called for is a new approach to siting. We suggest a political market,

via a referendum mechanism that recognizes the *de facto* property rights assumed by local communities. The referendum, supervised by the state, would be held at the request of the firm wishing to site the facility. The developer, in effect, would offer a comprehensive package of incentives to the community in exchange for a yes vote.

Protest is Effective

To understand the rationale of our approach, it is necessary first to examine the evolving nature of the property rights in question, an evolution driven by changing perceptions of the risks associated with toxic waste disposal and a social movement of considerable power that has raised the cry of 'not in my backyard'. Of course, citizens as individuals have much to gain by opposing hazardous waste facilities near them, but their resistance imposes large costs on society as a whole. After all, blocking new waste facilities does not make the waste itself disappear. Quite the contrary: growing quantities of toxic chemicals held in temporary and deteriorating storage conditions as they await destruction or a permanent home create strong incentives for illegal 'midnight dumping'.

Hazardous wastes are a byproduct of the chemical revolution that followed World War II. Until recently waste disposal was not considered a social problem. Dumps containing hazardous materials were treated by the public and planners as minor extensions of garbage dumps and sanitary landfills; and opposition, if any, was based on the dumps' nuisance characteristics, not on their perceived safety risks. As for property rights, the developer's entitlement to engage in waste handling was pre-eminent as long as the facility was located in an industrial area.

Passage in the US of the Resource Conservation and Recovery Act (RCRA) in 1976 marked official recognition that these wastes, many of them disposed of improperly in the past, posed a potentially serious threat to health. Three years later, the Superfund legislation targeted existing toxic waste dumps for clean-up. In between, the issue exploded into public awareness when the problems at New York's Love Canal reached the national news media. Subsequently the entire town of Times Beach, Missouri, was abandoned after authorities found dioxin contamination there in 1982, and news reports of contaminated drinking water wells now are commonplace.

Proposed hazardous waste facilities quickly became the subject of widespread and effective protest, despite stringent federal design and operation safety standards imposed by RCRA and augmented by state regulations. For example, four years of work and \$1.5 million were spent on a comprehensive treatment and land disposal facility in Los Angeles County before its corporate owner withdrew in the face of seemingly insurmountable public opposition. In Texas, a regional authority proposed a high-temperature incinerator for toxic wastes

from the area (a solution favoured by environmentalists). Notwithstanding a well-demonstrated need for such a facility and initial support from local governments, citizen opposition caused the developer to give up after a three-year battle when it became apparent that political approval was not forthcoming.

Aversion Profiles

'Not-in-my-backyard' aptly captures the views of those who resist facility siting. The syndrome itself is not new: homeowners have long resisted having undesirable facilities in their neighbourhoods. What is new is the scale and intensity of protests provoked by facilities perceived to be a risk: Figure 16.1 shows the percentage of the public in a national survey² who were willing to accept (without protesting or moving) each of five hypothetical facilities.

Three distinct 'siting aversion profiles' emerge, with corresponding 'backyards' and protest constituencies. Reactions to a ten-storey office building represent a useful baseline. Over half say they would accept one if it were at least a mile from their homes. Majority acceptance of an industrial plant or a coal-fired electric power plant, both likely to be perceived as dirty and potentially obnoxious neighbours, occurs at about nine miles. High contrast is provided by the two facilities posing potentially catastrophic but extremely low probability risks. Both a nuclear power plant and a new, well-regulated disposal site for hazardous wastes reach majority acceptance only at the 50-mile mark, a 'distance premium' of 49 miles from the office building baseline. This suggests a crucial difference between an ordinary industrial facility and one involving hazardous wastes: the neighbours affected by the latter involve entire communities. Another difference is the number of people who feel strongly about the issue. Whereas only 9 per cent expressed the extreme view that they did not want the two industrial facilities as neighbours 'at any distance', 29 per cent took this stance about the two 'risky' facilities.

Protest Mobilization

At the local level, the aversion to hazardous waste facilities is translated into active protest whenever new facilities are proposed. Why do local residents protest? Mobilization is facilitated by: (a) the high cost perceived to be imposed on the local community by the facility; (b) the low cost of protesting; and (c) the high probability of success.

First, hazardous waste facilities are a prime example of a regulated entity whose costs and benefits are so distributed that the former are concentrated, while the latter are distributed far beyond the local area. The principal costs believed to be posed by these facilities are the health risks posed by groundwater and soil contamination in the case of landfills and contamination of the air by

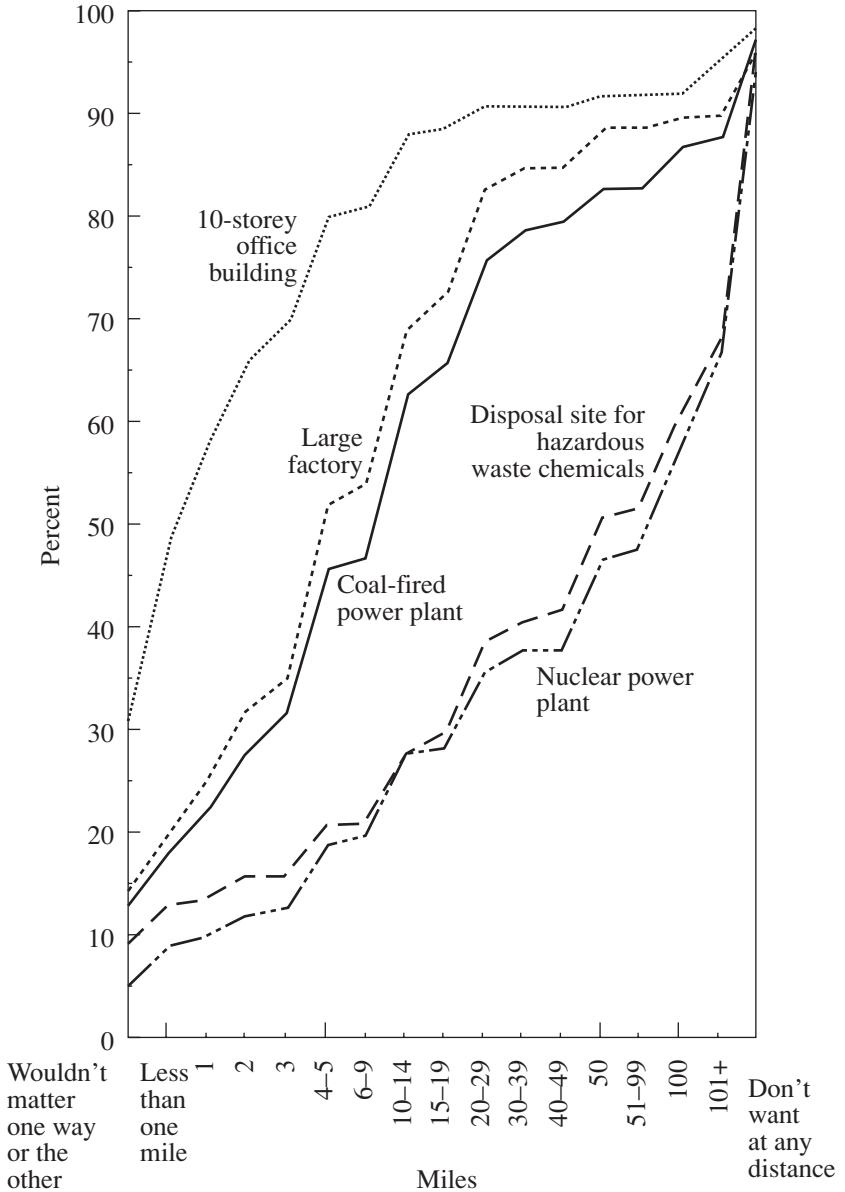


Figure 16.1 Cumulative percentage of people willing to accept new industrial installations at various distances from their homes

cancer-causing substances in the case of incineration facilities. The high level of perceived risks may be attributed both to the institutional context in which these risks occur and to the nature of the risks themselves.

The news media have highlighted past failures to handle toxic wastes properly and scientific uncertainties about the risks they pose to the public. At the local level, the siting issue appears as an abrupt threat that involves a visible source (the site) for which clear responsibility can be ascribed (the developer) – characteristics that heighten public awareness of the perceived risk. In contrast to nuclear power plants or industrial plants, for which there is usually a local constituency, a hazardous waste facility provides few offsetting benefits such as jobs or tax revenues (Tarlock 1984). Finally, residents may fear the decline of local property values.

The degree of concern about the risk externality posed by the facilities is strongly influenced by the nature of the perceived risk, which includes characteristics that have been shown in other contexts to be strongly associated with risk aversion (Slovic *et al.* 1980). They are perceived as:

1. involuntary (imposed on the community without its consent);
2. lethal;
3. memorable (due to being subject to arresting media coverage);
4. not susceptible to personal control;
5. persistent (having the potential to affect future generations); and
6. unfair (since most of the benefits accrue to those living far beyond the geographic area subject to risk).

Two characteristics of siting controversies help lower mobilization costs. First, the local character of the controversy makes it easy to identify and communicate with potential protesters. Geographic concentration also allows use of pre-existing social networks and institutions (such as churches and neighbourhood organizations). This reduces organizational costs and makes free-riding easier to manage through informal social control in the form of pressure to participate.³ Second, public participation procedures used in many siting processes, such as hearings, offer a focal point both for organizing and for news media coverage, and easy access to decision-makers.

For individual participants, the cost of mobilization involves time and money. This includes time spent in activities such as recruitment, fund raising and organizational maintenance, as well as time spent in protest activities such as writing letters, working on lawsuits, and organizing and attending rallies. The time commitments necessary for a successful local protest movement are lumpy; only a relatively small number of activists need to commit substantial amounts of time to the effort. Siting efforts easily mobilize the necessary number of local residents who are concerned enough to become activists. For most par-

ticipants, only occasional participation is necessary, because much is demanded of only a few.

The third factor affecting mobilization is the perceived likelihood that the protest activity will benefit the participant. Some people, usually highly committed activists, derive utility from the act of protest itself, which confirms their values and sense of self-worth. The efficacy calculus for ordinary participants normally involves a belief that their cause has some chance of achieving its goals. Factors that contribute to a sense of efficacy in siting protests include the widespread support for the protest in the affected community, the frequent sympathy or even support for the protest on the part of local elected officials, the availability of proven tactics (ranging from sit-ins and demonstrations to lobbying and legal interventions), expertise (from national organizations), and arenas in which to contest and delay the siting (such as local hearings, the courts and, of particular importance, local zoning and permitting processes).

Evolving Property Rights

Property rights specify how persons may benefit or be harmed and, therefore, who must pay whom to modify the actions taken by affected parties. In a now-famous article, 'The problem of social costs', Ronald Coase (1960) argued that the assignment of property rights to one party or another does not, in the absence of transaction costs, affect economic efficiency, although it does affect the distribution of wealth. Coase's insight was deep: resources are put to their most efficient use regardless of how the political system initially chooses to allocate property rights. The problem with the hazardous waste situation is that currently no one really has clear title to site a hazardous waste facility: not the firm, not the community, and not community residents as individuals.

Harold Demsetz (1967) correctly saw that property rights were subject to change over time to 'accommodate externalities associated with important changes in technology or market values'. As noted, firms wishing to site a hazardous waste facility have lost their unfettered right to locate where they wished as the public and government officials became alarmed over the possible risks posed by the technology. Local residents increasingly have been able to delay (and thus effectively block) siting efforts in administrative and judicial hearings, and communities have taken a leading role in stopping the construction of new hazardous waste facilities through the use of their extensive police powers to regulate zoning and safety. With a few exceptions, however, communities do not have the legal right to ask for sizeable payments in exchange for issuing the necessary licences and permits.

The recent establishment of state siting boards with the power to pre-empt local governments is an attempt to reassert the former property rights regime. The concurrent establishment of schemes for compensating communities for

the presence of a hazardous waste facility represents a movement in the opposite direction – towards giving the property right to the community. The innovative Massachusetts siting law (O'Hare *et al.* 1993) has both features, going further in the direction of bargaining for compensation and less in the direction of pre-emption (calling for binding arbitration only in the case of irreconcilable differences) than any law in the country. No facilities yet have been sited under this law, suggesting that compensation without ultimate local veto power over a facility may not be a successful strategy.

Community Rights: A Proposal

If local residents were individually to hold the property right, developers could not bargain efficiently with the large number of potentially affected residents and one holdout could block a well-conceived project. We suggest, therefore, that a *collective property right* be established by having states pass a law specifying the use of referendums to determine local approval or rejection of a proposed facility. Such a law would require the relevant political authorities to hold a referendum when requested by a qualified developer meeting state requirements. Specific plans for the facility and for compensation to the community for its perceived drawbacks would be proposed by the developer and incorporated into the ballot proposal. Developers obviously would aim at selecting potential sites where voters would be more likely to agree to the least expensive package of measures designed to compensate a community for accepting the facility. Designing the package and promoting it would necessarily involve the equivalent of a public participation programme. Naturally the costs of the package would be passed on to enterprises that wished to use the facility. In order for such a proposal to be viable, there would have to be enough technically acceptable sites available so that the political market could be sustained, and no single community would have a siting monopoly.

A number of possible compensatory measures have been suggested in recent years, and the contents of a developer's particular package probably would vary according to the nature of the facility, the characteristics of the site, and the community's concerns. The types of measures that might be offered include guarantees against declines in property value, incentive payments to the community (which could be earmarked to reduce property taxes or for other purposes), outside monitoring,⁴ accident insurance, credible guarantees of non-abandonment, donation of land for use as parks, and in-kind services like free waste disposal for community residents and businesses.

Should the decision rule be a simple majority, or something larger, such as the often-used two-thirds majority? Although a two-thirds majority requires a more expensive package, we argue that it is more likely to result in a Pareto-improving outcome and greater community harmony.

Who would administer and enforce the contract established by the referendum? This undoubtedly would fall first to the local political authorities and ultimately to the state. This must be made clear beforehand, because doubts about enforcement would increase the payments required to pass the referendum. In addition, there must be sufficient administrative flexibility to respond to new EPA regulations and to technological change. The boundaries defining who should be allowed to vote on the proposal is a difficult political question that the state legislature would have to decide.

The advantages of a referendum law are several. The developer and the state have strong incentives to address the issues of most concern to the community. The community's incentive to be intransigent is minimized because it has the power to say no, and it is protected from unwittingly accepting too great a risk because the facility would have to meet strict federal and state safety regulations. Moreover, the debate occasioned by the referendum should ensure close scrutiny of the developer's proposal. Paying for the compensation package transforms the costs – hitherto concentrated on the local community – into altogether more equitably shared burdens, borne by the ultimate beneficiaries of the facility. Finally, to the extent that this plan increases the costs of handling hazardous wastes, those who produce the wastes will have an incentive to engage in in-plant waste stream modifications and resource recovery.

FURTHER REFLECTIONS

From Theory to (Almost) Practice

Almost simultaneously with the publication of our paper, and quite by coincidence, the *New York Times* (6 May 1986) reported that something which illustrates some important components of our proposal was in the works in rural Lisbon, Connecticut.

According to the *Times*, Philip Armetta had proposed to locate in 3400-resident Lisbon a modern incinerator that would generate both energy from waste and \$1 million in tax revenues. Despite the financial incentive and assurances that the incinerator would be equipped with the latest antipollution devices, Armetta was rebuffed. Indeed, the issue so galvanized the electorate that in November 1985 forces opposed to the incinerator captured control of Lisbon's Planning and Zoning Commission. In January 1986 the Commission majority delivered on its campaign promise and voted to prohibit the siting of waste plants in Lisbon.

At this point Armetta put a new spin on his proposal. In place of saying it would bring the town \$1 million a year in new tax revenues – a solid-enough figure but one lacking appeal to individual voters – he promised to pay the 1986

property taxes of every landowner in Lisbon and to continue paying the same amount for the next 25 years. At an average of \$900 per homeowner, Armetta had shrewdly calculated, his promise came to a rough annual total of \$1 million. The dollars involved may have remained constant, but political winds shifted, minds changed, the local newspaper modified its editorial stance, and a referendum was scheduled. In a turnaround from the November election, Lisbon voted 680 to 590 to rezone the town to allow incinerators.

Had our proposal been law, Armetta would have his incinerator and Lisbon's property owners would have their \$900 per year for 25 years. But Connecticut does not permit binding referendums in such matters and the vote thus was only advisory. In a meeting on 25 August 1986 the town Planning and Zoning Commission again voted against the incinerator by a 5 to 4 vote. Was the issue then dead? 'Nothing's dead when a substantial number of people still want it', said Lisbon First Selectman in a prescient post-vote telephone interview with the editor of *Resources* in 1986. In 1993, the Wheelabrator Company began construction of the incinerator and it is now in operation.⁵

From our property rights perspective, the negative vote by the newly elected Commission reassured property owners that the incinerator would not be forced on them and therefore that the property right was theirs, and this was confirmed by the developer's championing the non-binding referendum on his proposal. With their intransigency level disarmed they apparently were more willing to listen to Armetta's proposal. His new way of framing it highlighted the compensation in a manner that helped voters make the risk-benefit calculation.

Developers Adaptation to Property Right Shift

In some instances, the shift in the property right rules of the game can occur by a new legislative mandate. An interesting case of this occurred in San Diego, California, in 1985 when a voter-initiated proposition passed that required voter approval of any proposal to increase the zoning density in a large block of agricultural and undeveloped land within the city. Previously the City Council, whose members were heavily dependent upon developer contributions, upgraded zoning in the block in a piecemeal fashion by approving zoning variances for a sequence of small projects that many voters found objectionable on environmental and city planning grounds.

What was the effect of giving the property right to the public in this way? It eventually resulted in a situation where developers developed winning compensation packages, but this did not happen right away. For the first ten years of the new regime, 1985-95, the voters passed only one of the three developer proposals the City Council placed on the ballot, and the one that passed was a fairly small and non-controversial project. The stalemate between the voters and the developers was suddenly broken in 1996. Over the three-year period

from 1996 to 1998 nine proposals for changing the zoning on large parcels of land appeared on the ballot and seven passed. The winning proposals conveyed much larger benefits to the public than would have been conceived of during the days when the San Diego City Council held the decision-making power. They included a lane on Interstate 15, large amounts of land dedicated to open space, parks and other public facilities. What happened? Each of the seven winning proposals received an endorsement by the Sierra Club while those the Club did not endorse failed. It appears that by 1996 the developers discovered that obtaining an endorsement from a trusted organization that had closely examined a proposal – in this case the Sierra Club – was an effective means of reducing the informational related transactions costs to voters. The Sierra Club apparently understood which types of compensation packages voters would approve and it successfully bargained with the developers on the public's behalf for a larger fraction of the surplus associated with the zoning upgrades.

The Willingness-to-accept–Willingness-to-pay Distinction

A consequence of giving the property right to the voters is that the appropriate welfare measure is willingness to accept (WTA). In our two examples above, the WTA amounts that bought citizen approval are much larger than the amounts the citizens would presumably personally be willing to pay (WTP) to prevent the loss they would suffer from having an incinerator as a neighbour or living in an overdeveloped community if the developer held the property right. According to the typical consideration of the relationship between maximum willingness to pay (WTP) and minimum willingness to accept (WTA) for a good, the dollar amounts of the two compensation measures of economic welfare change should be quite close together. This belief stems largely from Willig's (1976) seminal work on price changes. If this is the case, it should not make much difference, either in terms of welfare calculations or actual behaviour, who holds a property right.

Recent research shows that WTA commonly exceeds WTP and that this difference is consistent with welfare theory. Large differences between willingness to pay and willingness to accept compensation measures were first observed in contingent valuation surveys (Hammack and Brown 1974). At first, this difference was seen as a survey artefact (Bishop and Heberlein 1979). Later work (for example, Knetsch *et al.* 1990) found substantial differences between the two measures even for everyday goods such as coffee mugs. A recent extensive review of the literature by Horowitz and McConnell (1999) suggests that the ratio of WTA to WTP estimates found in surveys is roughly the same as the ratio for actual transactions.

Two competing explanations have been put forth to explain the divergence. The first is prospect theory (Kahneman and Tversky 1979) which replaces

utility theory's emphasis on final asset positions with a descriptive framework for analysing preferences based on gains or losses from a neutral reference position. According to prospect theory, the value function is steeper for losses than for gains. The second is Hanemann's (1991) extension of Willig's neo-classical framework to consider imposed quantity changes. Hanemann's work shows that the difference between the WTP and WTA measure is a function of the ratio of a Hicksian income elasticity term to a Hicksian gross substitution term. For changes involving large income effects or fairly unique commodities, the difference between a WTP and a WTA measure can be quite large. In the case of imposing an incinerator or a hazardous waste facility on existing residents, the good in question is typically quite unique and as such there is little to distinguish between standard neoclassical theory and prospect since both predict that there may be substantial differences between WTP and WTA measures. As Knetsch (1990) notes, the common practice of substituting a WTP estimate for the correct WTP measure can substantially underestimate the amount of compensation necessary to gain voluntary acceptance of the proposal.

Recent models that incorporate bargaining, information effects, transactions cost/experience, and uncertainty show considerable promise in being able to explain the magnitude of the divergence between WTP and WTA amounts (see, for example, Kolstad and Guzman 1999; Zhao and Kling 1999; List 2000). This work suggests factors such as knowledge of the magnitude of the potential gain to the facility operator; reversibility of the activity; trust in the operator, government regulatory authority, and non-governmental organizations (NGOs) actively involved in the issue; information-related transactions costs, and experience in making similar transactions may influence the amount of compensation required to gain voluntary acceptance of the facility. Groothuis *et al.* (1998) show that it is possible to do a WTA contingent valuation survey to obtain an estimate of the required compensation for a given case.

SITING EXPERIENCE IN THE 1980s AND 1990s

We now turn to the siting experience of the past two decades to see if there have been any successful sitings⁶ of hazardous facilities since 1980 and, if so, whether the property rights were clarified along the lines of our original proposal. We were able to find descriptions of seven successful sitings of hazardous facilities. In six of the seven cases the procedures effectively granted the property right to the community, most commonly by requiring a favourable vote in a local referendum.

The continued failure to site hazardous facilities in the late 1970s and early 1980s owing to not-in-my-backyard (NIMBY)⁷ protests (Murdock *et al.* 1999) and the perceived dearth of alternative ways to dispose of hazardous chemical

and nuclear wastes led government agencies to redouble their exertions to solve this problem. During the 1980s 'directed siting' procedures that use a top-down approach began to be replaced in a number of states and countries by the 'voluntary' or 'willing host' approach.⁸ Today, according to Puschchak and Rocha (1998), the voluntary approach 'is the preferred method of siting risk-generating facilities'. As its name suggests, this approach's key feature is the proviso that a prospective host can terminate the siting process at any time, a proviso that clarifies the property right ownership along the lines that we advocated in 1986.

Table 16.1 lists the seven successful sitings we were able to identify in the scholarly literature;⁹ five are hazardous waste and two are nuclear waste facilities. The facility located at Last Chance, Colorado in the early 1980s represents, fittingly enough, the last case of a siting authority – in this case the State of Colorado – imposing a comprehensive hazardous facility on an unwilling community. In the wake of vigorous protests by local ranchers in this largely unpopulated rural area, the Adams County¹⁰ commissioners voted to reject the Last Chance siting proposal, whereupon the State of Colorado promptly amended its siting law to enable the state ultimately to force the county to accept the facility. Making the best of a suddenly altered hand, the commissioners negotiated with Browning-Ferris Industries, then the owner of the site, to obtain the best possible benefits package (Gerrard 1994).

Of the remaining six siting successes, the Swan Hills, Alberta comprehensive hazardous waste facility is particularly noteworthy because it was the first *major* siting success in the 1980s and pioneered the use of the voluntary approach. Swan Hills,¹¹ an economically depressed community of fewer than 3000 residents located northwest of Edmonton in the Canadian province of Alberta, now hosts 'the most comprehensive waste treatment and disposal facility in North America' (Rabe 1994: 61).¹² The process of siting this facility, which opened in 1987, began in 1980 when the Alberta legislature approved a radical change in the Province's siting process proposed by a special Hazardous Waste Management Committee. The new voluntary strategy emphasized openness and public participation throughout the siting process, including the early stages when the geological criteria were being established and applied through constraint mapping. To be seriously considered, an aspiring host community was required to win the approval of a majority of its voters in a referendum.

Fifty-two Albertan communities voluntarily expressed a preliminary interest in the possibility of hosting the facility. Intensive efforts were made by the provincial officials to meet with groups in each of these communities. Despite some early problems with the quality of a workshop contractor's efforts which alienated some of the potential hosts, five communities remained whose leaders were sufficiently interested in hosting the facility to seek their residents'

Table 16.1 Successful sitings in 1980–1995 of hazardous facilities described in the literature

Type of Facility and Location	Decision Mechanism and Vote	Compensation – Benefit Package	Special Factors	Sources
1. Hazardous waste landfill and treatment facility. Last Chance, Colorado, USA	Approved in 1983 by Adams County commissioners after state threatened to use pre-emption.	Among benefits negotiated by the county were specified engineering techniques and truck routes, payment of 2 per cent of gross revenues to county, right to review construction and inspect the facility.	Rural, little populated, ranchland.	Gerrard (1994)
2. Hazardous waste solidification and disposal facility. Does not include an incinerator nor does it handle organic wastes such as PCBs. Blainville Quebec, Canada	Explicit declaration that siting would proceed only if a community formally agreed to participate. No mention of referendum on the facility <i>per se</i> but siting proponents won a contested 1981 referendum to fund an exit to a major highway needed for the facility.	No direct economic benefit. However the community secured a cloverleaf exit needed for commuting and economic development and the transfer of land from Canadian military to the city for an industrial park.	Small working-class suburb of Montreal. The siting effort lacked the institutional framework of the other Canadian sitings.	Rabe (1994)
3. Hazardous waste storage, treatment and disposal facility. Does not include an incinerator nor does it handle PC13s, dioxins, or cyanide. Greensboro, NC, USA	In 1983–84 developer sought 'broad community consensus'. Actual decision mechanism unspecified in sources.	According to Rabe (1994) economic compensation was minimal. Procedural compensation, such as a number of 'explicit guarantees against exploitation' were of critical importance.	Individual developer, a resident of Greensboro, convinced the community that the facility was needed and would be safe. Gained early support of environmental leaders.	Committee on Risk Perception and Communication (1989); Rabe (1994)

4. Comprehensive hazardous waste facility. Swan Hills, Alberta, Canada	1984 local referendum, 79 per cent in favour.	Local jobs (amounted to 90 jobs in 1991); 35 subsidized housing units; other government and corporation support such as a golf course, new fire equipment; commitment to restrict waste imports; special facility safety measures.	Small (pop. = 2400), economically depressed oil town. Model for the voluntary approach. Exceptionally strong public participation effort.	Schmeidler (1993); Rabe (1994)
5. Integrated hazardous waste facility. No incinerator. Montcalm, Manitoba, Canada	1991 local referendum with about 67 per cent in favour.	Prospect of economic diversification attractive but not crucial. Community received tax revenues from facility; corporation contributed funds for community facilities. Guarantees to recompense any loss in property values. Strong co-management agreement.	Rural municipality consisting of three villages. Small (pop. = 1700), relatively prosperous French speaking community. Siting process emulated Alberta's.	Rabe (1994)
6. Low-mid-level nuclear waste. Wolfenschiessen, Switzerland	1993 vote in town meeting by raising hands with approximately 60 per cent in favour.	\$3 million a year for 40 years (amounts to \$4687 per family).	The facility also required approval in a cantonal referendum.	Frey <i>et al.</i> (1996a, 1996b); Frey and Oberholzer-Gee (1997); Richardson (1998)
7. Low-level nuclear waste facility. Deep River, Ontario, Canada Site withdrawn in 1997.	1995, local referendum, 72 per cent in favour.	Agreement to maintain 1995 employment levels at AECL's nearby Chalk River Nuclear Labs, 8.75 million dollars in economic diversification funds.	Majority of Deep River workers are employed by Canada's equivalent of the Department of Energy, the AECL. Negotiated package was subsequently rejected by the federal government which led to the withdrawal of the site.	Latonis (1996); Richardson (1998); Gunderson and Rabe (1999)

Note: Includes landfill, incineration and various treatment technologies unless otherwise specified.

approval, which they received in every case and in three by large margins. Swan Hills, with 79 per cent voting in favour, was judged to be technically superior to its rivals. Despite determined efforts by a competitor community that 'storm[ed] the Alberta legislature in a futile protest' (Rabe 1994: 68), Swan Hills won the right to host the facility.

It should be noted that when Swan Hill officials first began to consider the siting prospect many residents reacted negatively and immediately formed anti-facility citizen groups. Pre-emptive level protests were avoided once residents realized that they would be able to vote the siting proposal up or down. Scholars who have examined the Swan Hill case identify a number of other factors which contributed importantly to this siting success. One was the institutional framework for siting and operating the facility. The province established a crown corporation which assumed 'a number of important responsibilities delegated to either private firms or regulatory agencies in most states and provinces' (Rabe 1994: 72). The corporation's independence, and the fact that it would oversee whichever contractor was chosen to build and operate the facility, helped it win the residents' trust. A second was the herculean effort made by local and provincial officials to meet with as many residents as possible in small group settings in order to hear and address their concerns. This was an extension of the extensive public participation effort that marked this siting process from the very beginning. The third factor was the compensation package that provided tangible economic benefits and safety assurances. The basic elements of the package were made known early in the siting process before the selection of Swan Hill, and additional features were negotiated prior to the referendum. The overall package included the promise of jobs, subsidized housing units, money for local facilities such as a golf course and new fire equipment. It also contained specified measures to take to ensure the facility's safe operation.

Manitoba emulated the Alberta voluntary process and succeeded in siting an integrated hazardous waste facility in the small rural municipality of Montcalm (Rabe 1994). The province began its siting process in 1988 and the Montcalm facility was approved four years later in 1992. Again a vigorous public participation effort combined with the assurance that the residents could veto the project enabled the proponents to overcome initial resistance. Because Montcalm was relatively prosperous, its compensation package focused on safety assurance and included institutional mechanisms whereby the community could play an active role in the facility's governance. The Montcalm Council was given the power to appoint an independent Community Liaison Committee and to nominate community representatives to a Plant Co-management Committee and the board of directors of the Manitoba Hazardous Waste Management Corporation. Sixty-seven per cent of the voters approved the siting proposal.

The two remaining successful hazardous waste facility sitings occurred earlier in the decade. Although neither involved a binding referendum on the siting issue, in both the proponents clearly signalled that they would not proceed without local approval. In the Blainville, Quebec case, the developer declared he would not go ahead unless the community formally agreed to accept the facility. Although there was no referendum directly on the issue, siting proponents won a contested referendum in 1981 which approved the construction of a highway exit from a major highway required by the facility (Rabe 1994). The second instance of a successful siting in the United States during our period occurred in 1984 when the Greensboro, North Carolina City Council accepted a hazardous waste storage, treatment and disposal facility. Again, there was no referendum, but the developer, a local resident respected in the community, assiduously sought a 'broad community consensus' (Committee on Risk Perception and Communication 1989) by holding many meetings with community leaders and citizens. Importantly, he succeeded in winning the support of local environmental leaders. In his search for consensus, he modified the proposal during the public participation period in order to address public safety concerns.¹³

Because they require secure storage for very long time periods, it is even more difficult to site facilities that handle nuclear waste. In the 1990s two governments, Switzerland and Canada, succeeded in siting new low-level nuclear waste facilities. The Swiss case, which involved a low-mid-level nuclear waste facility, is described in a series of articles by Oberholzer-Gee and Frey and colleagues. Originally the federal government and the developer were opposed to granting veto power to local communities, but the canton of Nidwalden successfully challenged this in court, with the result that *both* the canton and the selected town gained veto power (Oberholzer-Gee *et al.* 1997). The authors do not describe the public participation procedures the authorities used to convince the population of the town of Wolfenschiessen of the siting proposal's merits but presumably they were extensive. The developer offered compensation in the form of a generous annual monetary payment to the community.¹⁴ In 1993 Wolfenschiessen voters approved the plan by a 60 per cent vote in a town meeting.

Several years later a similar facility was sited in Ontario after an arduous effort. Again the siting procedures followed the Alberta model including the requirement of a binding referendum. The authorities found the low-level nuclear waste facility a hard sell and the siting effort nearly became unraveled due to bureaucratic problems (Gunderson and Rabe 1999), but eventually the residents of Deep River voted for it by a large margin (72 per cent). One factor that made the facility less threatening to the community was that many residents were employed by the nearby Chalk River Nuclear Labs. Another was the very generous compensation package that the community negotiated with the siting

agency, which committed the government to maintain the 1995 employment levels at the local nuclear labs and to provide a generous amount of money in economic diversification funds.¹⁵ We regard this as a successful siting from our perspective even though the provincial government ultimately refused to accept the negotiated compensation package.

Our review of these siting successes confirms the importance of establishing a clear property right as the basis for negotiation between developers and agencies who wish to site a hazardous facility and prospective host communities. Every case but one granted this right to the community. Without this, pre-emptive protests would likely have prevented the siting process in many, perhaps all, of the communities described above, and in other communities which ultimately voted against hosting the facility, from reaching the voting stage. When the property right is granted 'the community's incentive to be intransigent is minimized because it has the power to say no' (Mitchell and Carson 1986: 289). For example, Denis Hall, a member of the Low-level Radioactive Wastes Siting Task Force stated: 'We got acceptance through a large majority of the voters in Deep River whereas earlier attempts through straw polls and other petitions that had been run around town indicated a strong rejection of a siting proposal' (Hall 1996). According to Armour (1999), a close observer of hazardous facility siting during our period: 'When a community is not forced into a corner and made to defend itself against an unwelcome intrusion, it is more likely to explore the possible positive as well as negative consequences of a facility siting decision'.

Also supportive of our argument that only community approval (preferably in the form of a referendum) clarifies property rights in a way that makes it possible for a community to meaningfully consider an offer to host a hazardous facility is what happens when this element is missing from an otherwise enlightened set of siting procedures. Massachusetts is one example. In our original article (Mitchell and Carson 1986) we were sceptical that the carefully devised and public-oriented Massachusetts siting procedures (O'Hare *et al.* 1993) would succeed. It did not; Massachusetts failed to site a single facility (O'Hare and Sanderson 1993).¹⁶ California is another example. In 1986, frustrated with its inability to site new hazardous facilities, the state passed the Tanner Act (McCarthy 1999) which mandated the use of citizen review panels in the hopes that they would encourage 'meaningful dialogue' and negotiation during the siting process. If its elaborate system of public participation failed to sway a target community to favour the siting of a proposed facility, the Act ultimately allowed for state pre-emption. The outcome? None of the various attempts to site hazardous waste facilities in new locations¹⁷ under the Tanner Act has succeeded.

We believe the cases of successful and unsuccessful sitings described in this chapter support the use of binding referendums as the best way to reassure

citizens that a proposed facility will not be forced on them against their will. Our cases show that binding votes by local residents have been successfully used in three countries and there is now widespread support for binding referendums in the siting literature (Sandman 1992; Kunreuther *et al.* 1993; Rabe 1994; Gerrard 1994; Kuhn and Ballard 1998). The rationale for referendums rather than approval by town authorities is that town authorities do not always represent citizen interests. Oberholzer-Gee *et al.* (1997) observe that: 'Politicians have a large number of private incentives (career opportunities, national recognition, etc.) to agree to siting proposals'. Moreover mistrust of public officials is very widespread (Armour 1999; Pharr and Putnam 2000). Other decision mechanisms, such as the devices proposed by some economists to use a lottery- or auction-based approach (Kunreuther and Portney 1991; Swallow *et al.* 1992; Quah and Tan 1998) are shown by Frey and Oberholzer-Gee to fail the tests, which referendums pass, of fairness and competence (Frey and Oberholzer-Gee 1997; Oberholzer-Gee *et al.* 1997).

CONCLUSION

There is no question that hazardous facilities are difficult, very difficult, to site in modern societies because the risks they pose are unacceptable to many people (Slovic 1999). Our examination of the siting successes since 1980 supports our view that clearly assigning the property right to potential host communities is a necessary condition for siting this type of facility. Of course the agency that attempts to site a facility must conduct a comprehensive and credible public participation programme, another necessary condition. Even so, many attempts to employ the voluntary approach to siting hazardous waste or nuclear waste facilities fail to win majority votes in some or all of the communities they approach. This is as one would expect; some proposed facilities are flawed, some proposed locations are inappropriate and some public participation programmes are insufficient or insensitively administered. But, to those familiar with the siting wars of the 1970s and 1980s, it may come as a surprise that some communities actually volunteer to host risky facilities and that referendums on siting proposals sometimes can win majority and even super-majority votes.

The purpose of this chapter is to reiterate the *central* importance of property right clarification as a condition for successful negotiation. We have noted above the growing acceptance of the voluntary approach and the number of scholars who recommend the use of referendums as a desirable decision mechanism. Few of these scholars, however, acknowledge that the essence of a voluntary siting approach is the clarification of the property right. Instead, they treat it as just one of a number of important siting procedures which they

regard as necessary for a successful siting process. For example, Kunreuther *et al.*, in their article proposing the 'Facility siting credo', approve of the voluntary approach and declare that: 'Subjecting the final decision to a binding referendum will help establish its legitimacy' (Kunreuther *et al.* 1993: 304). But referendums are considered optional and the voluntary approach is included in a list of seven recommended procedural steps that are given equal weight. In his list of the 'four design characteristics of successful siting demonstrated in the Alberta case', Barry Rabe (1994) does not include the importance of clarifying the property right by giving communities veto power. Other discussions of hazardous waste siting policy don't even consider the property right issue (Lowry 1998; Kuhn and Ballard 1998) including discussions that treat the issue from the economic point of view (Swallow *et al.* 1992; Wagner 1998).

We believe that the siting of new hazardous facilities, an inherently difficult task in modern democracies, is close to impossible unless property rights are clarified in the way we have suggested. Clarification, by recognizing that the local community holds the property right and can vote the project up or down in a referendum, reduces the incentives for residents to mobilize for a pre-emptive protest movement. On the other hand clarification creates incentives for state authorities to engage in an intensive public participation process and the developer to negotiate an acceptable compensation and reassurance package.

NOTES

1. These include waste treatment facilities, landfills and incinerators.
2. These data are from a survey conducted by Resources for the Future (Mitchell 1980). The general shape of the profiles has been found to be robust against alternative question wordings and the addition of other types of facilities.
3. We use social movements theory here, specifically the resource mobilization approach (Zald and McCarthy 1979).
4. If the developer or government is not trusted by the community to monitor the facility, the cost of a winning compensation package may be drastically increased. Monitoring by an outside agent, such as an environmental organization, might reduce the cost of the package's other elements.
5. <http://www.workonwaste.org/wastenots/wn255.htm>. The same source reported that Armetta will be paid about \$3 million for his role in linking up another waste incinerator company with Briston-area communities.
6. We consider only facilities sited at new locations, not those sited at an existing hazardous waste site.
7. The acronym stands for Not In My Backyard and is used to refer to the knee-jerk opposition by communities proposed as sites for risky facilities.
8. At the time we wrote our paper we were unaware of the early movement towards a voluntary approach in Canada.
9. We do not include in our list any sitings that have occurred in places with existing hazardous facilities; our focus is on new sites. We have not examined the various trade journals and other primary sources of information on this subject.
10. The area is home to only a few people and there is no community located near the proposed site.

11. Our description of the Swan Hills case is based on Rabe (1994).
12. This small, isolated community was hard hit by a permanent downturn in the local oil industry, which had been its economic base.
13. Our source (Committee on Risk Perception and Communication 1989) does not mention any economic compensation.
14. On the basis of a survey they conducted in communities facing the prospect of hosting the nuclear waste site, Frey and Oberholzer-Gee (1997) conclude that compensation *reduces* people's likelihood to vote in favour of the facility because they resent the offer as a 'bribe'. We believe this finding is an artefact of their asking respondents how they would vote if \$x compensation is offered *after* they have already said how they would vote with no mention of compensation. If the compensation had been included in the scenario for the original vote we believe few if any respondents would express moral objections and that the vote for the facility would have been as high or higher.
15. Indeed the compensation was too generous for the federal government, who rejected the package, leading Deep River to withdraw its siting permission.
16. In their post-mortem two authors of the plan blame its failure on 'design defects of the law itself and general characteristics of the Massachusetts public decisionmaking process' (O'Hare and Sanderson 1993). Although the defects they identify are many, they fail to recognize the key importance of clarifying the property right.
17. Two sitings occurred in at existing oil company facilities.

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