“Siting Hazardous Facilities: Lessons from Europe and America”

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Chapter 9. Siting Hazardous Facilities: Lessons from Europe and America

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1. INTRODUCTION

With growing concern over environmental and health protection, siting controversial facilities, from prisons to power plants, has become increasingly difficult and has emerged as a policy problem of major significance in North America and Europe. In the United States, this problem is acute. A national survey revealed in 1990 that 62 per cent of the US public oppose placing a new landfill in their community and a 53 per cent majority believes that current land disposal technologies are inadequate to protect groundwater (Cambridge Reports 1990).

The situation is also acute in many European countries although there are some successes to report. Switzerland is struggling to find host communities for solid waste landfills with some limited success (Renn 1994). In Austria, a private firm has gained permission to locate a hazardous waste landfill in one Austrian state, although Austria’s overall programme to locate facilities in each state is partly stalemated (Linnerooth and Davy 1994).

The siting impasse has been the subject of extensive analysis (Kunreuther and Linnerooth 1982; O’Hare et al. 1983; Greenberg et al. 1984; Kasprow 1986; Colglazier and Langum 1988; English and Davis 1987; Kasprow et al. 1992). At a National Workshop on Facility Siting in the United States in 1990 a group of practitioners and researchers developed a set of guidelines for siting noxious and/or hazardous facilities. These guidelines were formalized in a Facility Siting Credo which focused on developing fair procedures and outcomes for locating facilities (Kunreuther et al. 1993).

No analysis, however, can lead to a blueprint for a siting procedure that will be acceptable to all parties, in all cases, and in all countries. The intent of this
chapter is (1) to review siting procedures that have been tried or proposed in North America and Europe, and (2) to analyse these procedures with respect to the perceived fairness of the process. Without labelling any siting procedures as more or less desirable or suitable, we will point out their differentiating characteristics with respect to the fairness of the procedures and the outcome. We begin by discussing common features of siting problems that need to be considered before contrasting different procedures. Section 3 characterizes the process in terms of who has the authority to make decisions and how open and accessible the procedures are to the public.

Section 4 discusses what we mean by a fair outcome by focusing on two broad criteria: efficiency, whether some overall societal goal is met at lowest social cost and equity, where distributive features of the solution are considered to be fair. After summarizing in Section 5 what we have learned from North American and European experiences, in Section 6 we pose a set of questions related to siting for consideration by Asian countries, most of whom face critical siting problems today. Throughout the chapter we will illustrate similarities and differences through examples of actual siting experiences.

2. COMMON CHARACTERISTICS OF SITING PROBLEMS

2.1. Many Interested Parties

In any siting controversy there are a set of interested parties, each of which has its own values and goals. There are those groups who would like to see the facility built because it yields sufficient benefits to them; others are likely to have serious concerns about the facility. Some of the key stakeholders are the applicant, normally a private firm or government agency interesting in having the facility built; public interest groups, such as local citizen organizations and environmental groups; government regulatory agencies for developing and enforcing regulations; and finally the general public where there may be a wide spectrum of attitudes about the facility.

Some of the interested parties may feel the same way about the facility but for different reasons. For example, an environmental group may oppose the construction of a high-level nuclear waste repository primarily because it would like to end the use of nuclear power and recognize that this will happen if there is no place to store the waste. Citizens groups may oppose the facility because of strong fears of an accident either to themselves or to future generations.

When one lines up all the different interested parties on a particular siting question there is likely to be considerable conflict on whether the facility is needed and, if so, where it should be placed. The fact that different groups may
have the same attitude towards a proposed facility but for very different reasons suggests that it is important to understand the nature of the controversy before making policy recommendations.

2.2. Uncertainty About the Risks

Even in the unlikely case that risk is defined in the same way by all the stakeholders there are likely to be significant discrepancies in estimates. For new technologies there are limited statistical data on how well the facility is likely to perform in practice. In the case of a proposed high-level nuclear waste (HLNW) repository in the United States, one has to rely entirely on theoretical or prototype analyses since there is no historical record to consult. Scientists may disagree on the assumption on which their analysis was based, and thus come up with very different estimates of probabilities and consequences.

In situations where stakeholders are talking about the same event (e.g. groundwater contamination from a landfill) they may still disagree on the consequences of the event both in time and place. Kaspersen et al. (1988) have pointed out that the consequences of risk events go far beyond direct harms to include many of the indirect impacts such as loss of confidence in institutions and the perceived fairness of the risk-management process. For example, the accident at Three Mile Island did not kill any individual but wrought enormous social consequences in the form of stricter regulations, greater opposition to nuclear power and an increased concern with other complex technologies such as chemical plants and genetic engineering. This potential social amplification of risk needs to be taken into account when designing the decision process and strategies for siting and managing new facilities.

Scientific experts and the general public are likely to define the nature of the risk differently. Scientists tend to focus on the probability of the event occurring and define the consequences as the fatalities, injuries and property damage while laypersons will focus on other dimensions of risk such as fear and dread (Slovic 1987). Thus facilities where experts feel that they pose little risk may be strongly opposed by the general public who are concerned with other features of the risk which are not part of the expert’s model.

2.3. Prerequisites for Successful Siting

Each siting case has its own unique characteristics and dynamics. Recognizing that political and legal culture in each country will influence the siting process, there are two prerequisites that are important for achieving success independent of the type of facility and where it is to be located:
Prerequisite 1: Achieve sufficient agreement that there is a need for a new facility
A facility siting process must begin with general agreement by the relevant interested parties that there are severe consequences of maintaining the status quo and that the proposed facility is needed. When there is disagreement on the issue of need then it may be difficult to site the facility as illustrated by the controversy that is now raging in the United States regarding the storage of high-level radioactive waste (HLNW):

*The Proposed Nevada Repository* In the United States, nuclear wastes are currently stored in holding ponds at the reactor site; however, the storage capacity of on-site facilities will be exceeded in the next few years. The nuclear industry and the federal government have argued that long-term geologic disposal is the solution to the HLNW problem. Yucca Mountain in the state of Nevada has been chosen as the site of a repository where the waste will be buried for 10,000 years. Those opposed to the repository feel that interim storage of spent fuel is now feasible and desirable using new technologies such as dry-cask storage and multi-purpose canisters. (Easterling and Kunreuther 1995)

Prerequisite 2: Achieve sufficient agreement that the proposed facility is acceptably safe
Unless the affected parties feel that the proposed facility does not impose significant health and safety risks it will be difficult to site a facility. Sufficiently rigorous design standards for mitigating future risks should be set and enforced. In some countries, as the following example illustrates, showing that the facility is acceptably safe from an expert point of view is sufficient justification to proceed with the facility:

*Siting Hazardous Waste Facilities in Austria* The federal government obtained an explicit agreement with the local community that expert judgments of acceptable risk for affected population and the environment would be valid grounds for siting a facility. The local citizens were part of the process of choosing the experts. (Linnerooth and Davy 1994)

3. ALTERNATIVE SITING PROCEDURES

3.1. Criteria for Evaluation

In describing different siting processes it is useful to specify two criteria, *efficiency* and *equity*, which have a long history in the social sciences and are useful for characterizing both the siting process and the outcomes.
Process efficiency is a measure of the expenditures in terms of time and money associated with finding a home for a particular type of facility. Process equity refers to the perceived fairness of the procedure from the viewpoint of the different interested parties concerned with the final outcome. Easterling (1992) is one of the few researchers who has tried to operationalize this concept. He stresses the importance of the legitimacy of a siting strategy in determining whether a facility will actually be built. In addition there is a need to establish trust between the interested parties in order for the siting process to be perceived as a fair one (Kasperson et al. 1992; Slovic 1993; Kunreuther et al. 1994).

A highly efficient siting process might be one where experts first find a low-cost/low-risk location for a facility and then the developer arbitrarily announces that it will be located there, often defending the decision in a climate of escalating public protest. This approach is classified as the Decide–Announce–Defend (DAD) model.

The DAD approach is generally viewed by the affected public as being highly inequitable because they feel excluded from the process. O'Hare et al. (1983) describe the end stage of this process as follows:

At the end of a process already far along, the developer thus faces a hostile population, composed of people who feel duped—informed of a project in the eleventh hour, and told by government and industry alike, 'love it or leave'.

At the other extreme members of the Berger Commission, in trying to determine whether a pipeline should be sited in northern Canada, travelled over 17,000 miles interviewing residents of affected small communities and villages. Millions of dollars were spent in the process, after which it was decided not to construct the pipeline (Gamble 1979). This process was viewed as procedurally fair by many of the affected parties, although the developer was uncomfortable with it. This process was a highly efficient one since it required enormous amounts of time and money.

3.2. A Typology of Siting Processes

One way to categorize differences in siting processes is by looking at decision authority and the openness of the process. Decision authority specifies which organization or group has the right to make the final selection of the site(s). This is a question of entitlement or property rights, where the property right in this case can be thought of as the right to impose risk (Whitehead 1991).

At one extreme is the case where the federal government has the authority to make a final decision independent of whether the community residents or the general public agree with it. The concept of eminent domain or takings is the classic example of the ability of government to take private property for public use without consent. At the other extreme is the ability of residents of the
proposed host community to determine whether or not to accept a facility through some type of social consensus process such as a referendum.

An open process is one where there is active public participation, and the different interested parties have standing in the siting debate and access to relevant information about the site. In a closed process decisions are made with little public involvement and can not usually be challenged by the affected citizens.

The adversarial process, which characterizes most siting debates today in the United States, best illustrates an open process. For example, in Massachusetts a private firm called Clean Harbors proposed a site for a hazardous waste incinerator costing $42 million. The firm was required to carry out a very detailed risk assessment study. Several local citizen groups then spent over $700,000 to critique this study and presented their findings to the Department of Environmental Protection (DEP). Based on these findings DEP recommended against approval of the facility because they felt it posed unacceptable health risks to the large surrounding population (Brion 1991).

The French system epitomizes this process since official decisions on where to site a noxious facility appear to be made by government officials behind closed doors, as illustrated by the decision process utilized by Gaz de France in determining where they should locate a liquified energy gas facility (Kunreuther and Linnerooth 1982).

Figure 9.1 depicts a typology for characterizing siting processes by crossing Decision Authority (x-axis) with Openness of the Process (y-axis). In each of the four resulting quadrants are examples of cases from Europe and North America which characterize these siting processes today. In some cases, there is an associated line which extends to one of the other quadrants, indicating that the process has changed over time. For example, the controversy over siting a high level nuclear waste repository in the United States, has moved from open process with some local local control to a closed process with government authority. Brief case histories of siting processes which fall in one or more of the four quadrants provides a perspective on the advantages and challenges associated with using different strategies for attempting to site new facilities.

Open process with local rights

A process with public participation and local rights has only recently been tried in North America. This process is illustrated with two cases: one in Canada and one in the United States.  

Siting a hazardous waste facility in Alberta. In 1979, the province of Alberta, Canada initiated a process to site an integrated hazardous waste facility that includes treatment, incineration and landfilling (of non-hazardous residues). The two innovative features of the process were that only communities that satisfied technical criteria of feasibility would be eligible and then only if they volun-
Figure 9.1  A typology of siting

teed to be considered as a possible candidate.

Planning grants were given to the nine communities that expressed an interest in hosting the facility and satisfied the technical criteria without any commitment on their part. These funds were used for feasibility studies, public information efforts and other public outreach efforts.

Two towns expressed an interest in hosting the facility. Swan Hills was ultimately chosen by the province to host the facility because this community, in contrast to the other, did not have fierce opposition from the surrounding rural population. The hazardous waste treatment centre in Swan Hills promised 55 new jobs, which convinced town leaders that other new developments such as a new hospital would now be feasible. The other town, Ryley, was disappointed with the outcome and placed a newspaper ad indicating that they should have won.

Siting a landfill in New York State  In 1990, William Ruckelshaus, the Chief Executive Officer of Browning Ferris Industries (BFI) made an unusual offer to virtually every municipality in New York State. He established a community
partnership program in which each town had an opportunity to consider hosting a solid waste landfill in return for a share of the benefits from its operation.

The process was entirely voluntary with the company requiring an official invitation by the community to even begin the process, at which time it began an educational campaign of open houses and tours of other BFI facilities. One community, Eagle (with 1300 residents) agreed to this process and eventually held a referendum in which the citizens turned down the facility. True to its word, BFI left town. Only after a grassroots movement organized another referendum which overwhelmingly favoured community partnership did the company return. By August 1993 a preliminary site had been identified and a benefits package which included tipping fees, local jobs and free trash disposal was agreed upon. In the subsequent months other companies, in addition to BFI, were invited by Eagle to make proposals for constructing a landfill. In February 1995, the town decided to proceed with one of these other companies (Raylman 1995).

Closed process with local rights
The juxtaposition of a closed process with local rights seems somewhat contradictory. If a community has the right to decide whether or not it wants a facility, then one would expect a fair amount of discussion as was the case in Alberta and Eagle, New York. We did find two cases falling in this category which are described below.

Siting an underground repository in Switzerland The community of Wolfenschüessen has 500 households and 1800 inhabitants. It agreed to host an underground repository for storing low and mid-level nuclear waste without much public discussion, most likely because the Swiss government made it clear that scientific experts considered the facility to be safe and offered the community 2.5 million Swiss francs for the next 25 years.

Since most residents of the community were convinced that the facility would not pose health and safety risks, they did not treat the compensation as a bribe. It is not clear how the money will be used by the community but if it was distributed to the residents then each individual would receive a sizeable sum per year for the next 25 years.

Siting a monitored retrieval storage (MRS) facility in North Dakota In 1987 a voluntary siting process was initiated in the US for temporarily storing high-level waste in MRS facilities until a permanent repository is built. Non-binding grants were provided by the federal government to enable communities to investigate the risks and benefits of hosting an MRS.

Three county commissioners in sparsely populated Grant County, North Dakota decided to apply for a grant in 1990 to study the possibility of hosting an MRS facility. They apparently initiated the process with little public awareness or involvement. The following March residents voted all three county
commissioners out of office in a recall election because they accepted this grant even though they knew it was not binding in any way.

Open process with government rights
By far the most common process in both Europe and the United States is an open process where the federal, state or local government have the right to make a final decision. This process is illustrated with two cases from Europe and one from the United States.

Siting a hazardous waste facility in Austria Like most European countries, Austria faces a hazardous waste crisis. Today most wastes are disposed of illegally or shipped to neighbouring countries (especially Slovakia and the Czech Republic). The federal government is required to identify and designate sites relying primarily on technical expertise but also listening to the opinions of residents, landowners and firms within the identified communities.

The siting process in Austria has moved from a closed to an open process as shown in Figure 9.1. Prior to 1986 citizens were given almost no information on the proposed facility and siting decisions were made with little public input. In 1986 the province of Lower Austria initiated a process that gave more discretionary latitude to local governments and citizens.

In 1987, Blumau and Enzersdorf were selected as possible candidates for the hazardous waste facility. A public participation process was initiated in both communities where citizen representatives were given broad responsibility in choosing the experts and monitoring the siting process. The final decision is legally in the hands of the federal government, whereby approval must be based on the results of the expert investigations assessing the risks of the proposed facility for the public health and environment. The experience and the outlook for this approach are rather different at Blumau, where this approach appears to have lost all legitimacy with the public, and Enzersdorf, where there is cautious optimism that the public will accept the facility.

Siting a high-level nuclear waste repository in Sweden There is political consensus in Sweden that it is necessary to store high-level nuclear waste from Sweden’s twelve nuclear power stations in Sweden and not to export the waste to another country for final disposal. A process for identifying an appropriate disposal site will proceed in two stages:

1. First, the utility-owned Swedish Nuclear Fuel and Waste Management Company (SKB) will develop a small demonstration of direct disposal, for which construction would start around 2005, with emplacement of encapsulated spent fuel starting by 2008. At this state, the waste would be in a retrievable mode.
2. After evaluation of suitability for final disposal, the demonstration facil-
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ity would be extended to a full repository, with disposal of spent fuel beginning around 2020.

In the meantime, SKB is constructing a rock laboratory for basic studies close to the Oskarshamn nuclear power station and the operating interim storage facility (CCAB). This laboratory is scheduled for completion during 1995.

Political leaders in two communities in the North have volunteered their areas as potential sites by agreeing to preliminary investigations, and discussions are in progress with several other northern communities. The willingness of the local community to accept the facility is an important consideration in the siting decision. Primary licensing authority rests with the Nuclear Power Inspectorate (SKI) and the National Institute of Radiation Protection. The siting process in Sweden has been characterized by openness and active public participation, with financial resources given to community and environmental groups (Ahstrom 1994; Nuclear News 1994).

Siting a low-level radioactive waste (LLRW) facility in Pennsylvania. As host state for the disposal of LLRW for the Appalachian Compact states, Pennsylvania has passed legislation and regulations outlining a screening process which would identify three of the best potential locations for a disposal facility, based on the administrative record. Legislation also require that the Department of Environmental Protection (DEP) establish an open and public process to locate a regional facility in the Commonwealth. The system is thus similar to the Austrian system for locating a hazardous waste facility described above.

Chern-Nuclear System Inc. (CNSI) was selected by the Pennsylvania Department of Environmental Resources (DER) in 1989 to site, license, construct, operate and close an LLRW facility in the Commonwealth. Legislation further requires the DEP to appoint a LLRW Advisory Committee to review draft regulations pertaining to the siting, design, construction, operation and closure of the facility. The site selection process is completed through the local disqualification phase. In July 1994, the DEP announced a policy to seek a volunteer community to host the facility. Thus allowing for real public involvement in deciding what is acceptable risk (Rue 1995).

Closed process with national/state rights
The most salient closed process today relates to the storing of high-level nuclear waste (HLNW) in the United States. Interestingly enough the process twelve years ago was a much more open one, but legislation in 1987 changed the character of siting. In this case, the United States has moved in the opposite direction from Sweden, as will be noted by comparing this case with the Swedish one described above.

Storing HLNW in repositories in the United States:

The Nuclear Waste Policy
Act (NWPA) of 1982 was the principal legislation for finding feasible sites to store HLW in underground repositories for the next 10,000 years. The Act recognized the need to find sites that would be both technically and politically feasible and called for a number of candidate areas to be characterized before making a final choice.

Under the Act, strict safety standards would be employed and regional equity would be sought. States would have an opportunity to disapprove of having a repository, but a negative vote could be overridden by Congress and the President. The system was thus identical to the Swedish program described above.

The NWPA was amended in December 1987 when Congress chose Yucca Mountain to be characterized, thus singling out Nevada, the least populated state in the country. The repository is scheduled to be constructed there by 2010 unless the site is shown to be unsafe or new legislation is passed by Congress putting the repository on hold and requiring temporary storage of HLW in dry-cask or multiple-purpose canisters, as discussed above.

As shown in Figure 9.1, the process for siting a repository has moved from one that was relatively open in 1982 to one that resembles the closed Decide—Announce—Defend (DAD) approach. Today there is considerable public distrust in the siting process, which overshadows experts' claims that the proposed repository will safely bury waste for 10,000 years (Flynn et al. 1992; Ericksen 1994).

4. FAIR OUTCOMES FOR SITING HAZARDOUS FACILITIES

In all parts of the world it will be increasingly difficult to find sites for hazardous facilities without the cooperation of the local citizens. This cooperation will not be forthcoming if public groups and other stakeholders do not consider the siting process and outcome to be fair.

4.1. What is a Fair Outcome?

Is it fair, for instance, to put a hazardous waste facility in an industrial area where the residents are poor and otherwise disadvantaged? Alternatively is it fair to choose a site in an environmentally pristine area in order to spread the burdens of industrial society more equally among the population? If one site is technically superior by minimizing the population and environmental risks, should the distribution of the risk burden matter at all? Do regions and even countries have a responsibility to deal with their own wastes and not to export them? Should the host community have the right of refusal? Should the community be
efficiency of alternative sites. So is the length of time that the facility is likely to be in place. If one treats future generations as part of a definition of efficiency then it is important to evaluate the long-run benefits and costs of mitigation measures as well as monitoring and control procedures in specifying an efficient outcome.

Siting a hazardous waste facility in Austria Technical efficiency was the raison d'être for selecting Blumau and Enzersdorf as potential sites for a hazardous waste facility in Austria. The procedures incorporated elaborate public participation processes for the stated purpose of confirming the technical suitability or efficiency of the candidate sites.

The technical efficiency approach to siting facilities works best, therefore, in hierarchical, top-down political systems (the more centralized approaches shown in Figure 9.1), where technical experts enjoy a position of trust and authority. The appeal of this approach lies in the notion of equal treatment of all communities since the selection depends only on technical conditions. Since the goal of technical efficiency is minimizing the societal risk burden, the approach might be regarded (by some) as inherently fair regardless of which community ultimately receives the facility.

Trust in expert authority, a prerequisite for this approach, is eroding in most Western countries. The authority and effectiveness of government policies for regulating and managing hazardous activities are often questioned when scientists disagree on the nature of the risks. These disagreements have led to a disturbing loss of public confidence in public sector institutions and their viability in the siting process is more likely to depend on building public trust with the different stakeholders than in managing risks efficiently (Wynne 1983).

Welfare efficiency
Welfare economists argue that it is not expert estimates of risks that should be the main criterion in siting decisions, but rather how people feel about the risks. Hence a welfare-efficient solution locates a site where the public’s perceptions of risk and costs are lowest. Using this criterion it is necessary to ascertain the nature of citizens’ preferences for avoiding the burden of a hazardous waste facility in their backyard.

One possible way to proceed is to identify the technically qualified sites and then to determine how much compensation the residents of each community would require to be willing to accept the facility. In contrast to the technical-efficiency criterion, which deemed the best site to be where the costs and risks are lowest, this welfare-efficiency criterion imputes the best site to be the one with the lowest required compensation.
4.3. Outcome Equity

Both technical and welfare efficiency (without compensation) award the full burden of the hazardous waste facility to one community but it does not have to be that way. For example, a number of smaller facilities can be sited rather than locating just one large one. This is the idea behind the Austrian hazardous waste legislation which requires each Austrian state to provide a waste disposal infrastructure (Linerooth and Davy 1994). But short of putting a 'barrel of waste in every community' it is hard to imagine an equal spread of the burden. If equality is the goal, a novel approach might be to choose a site among qualified communities by lottery, thus achieving a sort of ex ante equality.

An alternative criterion for determining where to site a facility is the extent to which the community has contributed to the hazardous waste problem. This might imply locating hazardous facilities at the same site where the wastes are produced. In a recent questionnaire to the Austrian public, contribution to the waste problem ranked highest among twelve different criteria for siting a hazardous waste facility (Linerooth and Davy 1994). This idea of responsibility for one's own wastes is a strong motivation behind recent European legislation to require countries to deal with their own wastes and not export them to other countries.

The most obvious, and most discussed, way of spreading the burden across society is to compensate the host community by sharing the benefits of the new facility with it. This compensation might be paid by the waste disposing industry which will then pass on the added costs to waste producers. Alternatively, it might be paid by central government thus passing the costs on to the taxpayers. Compensation can take many forms ranging from direct monetary payments to the community (e.g. tipping fees) to in-kind payments such as providing the community with a new hospital or perhaps 'green' improvements such as parks or bicycle trails (Gregory et al. 1991).

Pareto Improvement

The notion of compensation underlies a key concept in thinking about equity, that of a Pareto improvement. An allocation of a good is said to be a Pareto improvement if everybody is better off with the new allocation and nobody is worse off. In the case of a hazardous waste facility, a Pareto improvement can be understood only by considering movements from the status quo. For example, the status quo might be a situation where the wastes are improperly disposed of and are threatening the environment. If the citizens are willing to pay to reduce or eliminate this threat, and if a community is willing to accept a facility for an amount less that the total willingness to pay, then a Pareto improvement is possible.

A Pareto improvement requires that the compensation be paid. The payment can be negotiated between the developer and the community. In such a
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market-based approach, the community or local government 'sells' its permission to site the facility and the developer 'buys' this permission. Naturally, this requires that the right to give permission lies with the local community. This is the basis of voluntary siting approaches such as the negotiated deal between Eagle, New York and Browning-Ferris Industries discussed in the previous section. The citizens of Eagle agreed to 'sell their permission' to BFI in return for a benefits package.

Local authority, preferably in the form of a referendum, is viewed as necessary for reaching a mutually agreed and beneficial siting choice. As suggested by the Eagle, New York case, negotiated compensation has had a few successes, but mainly with respect to siting solid waste facilities. In the US, it is common to impose 'host fees' or fees on the wastes that go to the community budget, and these can be rather significant (reducing property taxes as much as 20 per cent). An Austrian community (Frommleiten) has benefited enormously from a waste fee from their solid waste facility, and this experience appears to be having a positive influence on other Austrian communities which would like to consider hosting a facility (Linnerooth and Davy 1994).

Others are sceptical of compensation because it explicitly and visibly places health and safety on the market. While economists point out that these kinds of trades are made in the context of hazardous jobs and other activities, evidence suggests that ex ante bargaining over the health and safety of families and children is not acceptable to many people. In fact, many residents view ex ante compensation as nothing less than a bribe. For example, in a recent study of attitudes to compensation in both Hungary and New York, Vary (1993) noted a marked reluctance to accept this quasi-market approach. Typical comments were: 'Human life cannot be compensated'; 'Compensation is bribery'; and, 'We cannot be bought'. Interestingly, ex post agreements to compensate victims appears more socially acceptable (Linnerooth, in press).

Environmental justice

For many people the Pareto improvement is not viewed as leading to fair outcomes, since facilities are often located in low-income and otherwise disadvantaged areas. Because of their economic circumstances, these areas will likely have a lower 'reservation price' for exposure to health risks than wealthy communities. This means they will sell their permission to site the facility for less than more advantaged communities. Therefore, it is less costly for developers—and more efficient in the Pareto sense—to locate waste facilities in the disadvantaged areas.

To the extent that minority populations, those in poor health, and other vulnerable groups live in poor areas, the process may be viewed as a breach of environmental justice since there will be a predominance of hazardous and otherwise undesirable facilities close to these groups (Bullard 1993). Experience with regard to hazardous waste facilities indicates that many citizens are reluc-
tant to negotiate a price for a facility (Portney 1985; Kleindorfer et al. 1988). If the majority of citizens in a community refuse to bargain for ex ante compensation, even the most fervent advocates of market approaches would agree that the process is not politically viable.

What is more controversial is the case where a poor or otherwise disadvantaged community does agree to negotiate for compensation. Some Native American tribes, for instance, are entering negotiations with the federal government on siting high-level nuclear waste repositories on their reservations. Environmental justice advocates are generally against such bargains on moral grounds. The following article in a local news bulletin illustrates the controversy:

Caught between tribal leaders desperate to lure investments to their reservations and federal and corporate officials desperate to find new waste dumps are the thousands of Indian families who simply want a safe homeland to pass on to their children... the MRS program is a classic example of environmental racism: the targeting of non-white communities for waste dumps, nuclear and otherwise. (Ethnic News Watch, p. 8)

Market advocates argue that an informed negotiation between the US government and tribal leaders is a legitimate and fair way to go about finding an appropriate site for storing spent nuclear fuel. If the site is proved to be technically suitable, and if the tribes have full authority to make the final decision, then they contend that a compensated deal should be viewed as both fair and morally correct. Forcing the wastes on an effluent community would be Pareto inferior or 'Pareto pessimai' in that both communities would feel themselves worse off than if the tribes had taken the waste with the agreed-upon compensation.

Yet many people may be willing to accept Pareto-pessimal outcomes and paternalistic processes to promote valued social ideals (Calabresi and Bobbit 1978). One such valued ideal may be that health and safety are inherent rights similar to the Rawlsian argument that certain individual rights—which might include health and safety—should never be traded off against material goods (see Elster 1992, p. 224). To those opposed to the market approach, allowing the poor to sell their health and safety is not a legitimate way of improving their economic condition (or even their health). As Frey and Oberholzer (1994) point out, the market approach accepts the status quo as given, whereas many people refuse to accept negotiated bargains, even among willing partners, based on what they see as an unfair starting point. As such, the siting of hazardous waste facilities in poor areas is viewed as an exploitation of those in poverty and not as a means of improving their economic condition.

Global efficiency and the no site option
No discussion on the efficiency and equity of siting wastes that already exist.
To some this position appears void of any fairness considerations, especially if doing nothing means leaving the wastes in environmentally inferior locations which expose people to high risks.

This seeming Pareto-pessimal position may, however, look different when viewed from the lens of long-term, global efficiency (Thompson 1994). If the whole siting issue is linked with the long-term objective of changing production processes towards lower waste economies, then the local Pareto-pessimal solution may be globally Pareto superior. The reason is that wastes that are ‘out of sight’ may lull institutions into a more passive mode with regard to industrial restructuring.

This argument often surfaces in siting debates. For instance, there is concern that the proposed underground storage of nuclear wastes at Yucca Mountain will inadvertently advance the nuclear option as a source of power which many consider nothing less than immoral. From this perspective, the proposal by Easterling and Kunreuther (1995) to store wastes at nuclear power plants in the medium term would allow the continued social dialogue on the desirability of nuclear power. Many view the phasing out of this technology as promoting long-term social welfare.

5. SUMMARY

If there is one thing to take away from this chapter it is that a good siting process and a fair outcome will vary across individuals, interested parties and regions. What one group views as morally justifiable may be seen as iniquitous by another group. Those who view Pareto improvements and market-based solutions as inherently fair and correct will judge voluntary siting procedures with negotiated settlements as the most appealing process. Disallowing these negotiated deals will be considered both paternalistic and unfair to poor communities that wish to improve their status.

Other groups are strikingly opposed to these kinds of deals. In their view health and safety cannot be (at least not visibly) bought and sold, and there can be no fair agreements based on unjust starting positions. These groups appear willing to accept an allocation where ‘everyone is (materially) worse-off’ in order to protect cherished social values.

Still other groups may be attracted to more hierarchical, top-down approaches to siting hazardous facilities, where the choice of the site is justified on technical criteria. Whereas this approach has been the most prevalent in Western countries, declining trust in expert authority is necessitating more open siting procedures.

Finally, some people take a position based on ideas of long-term social efficiency. These groups find that even the undesirable status quo—keeping hazardous wastes in unsuitable facilities—is superior to the ‘out of sight, out of
mind’ alternative of long-term disposal. Their implicit goal is to restructure economies towards more sustainable uses of resources and less waste.

Each of these views is legitimate and should be respected in the policy process. Indeed, if social conflicts regarding technology and siting processes are not to become more polarized, then it is important to create mutual respect among those holding different concepts of fair procedures and outcome. This will require building institutions based upon mutual respect for the competing concepts and ideas of fairness.

6. RELEVANCE TO ASIAN SITING EXPERIENCES

We conclude this chapter with an open set of questions on siting which should serve as a basis for comparing the Asian experience with Europe and North America.

6.1. Political Culture

- What are the special features of political culture that affect siting processes in different Asian countries?
- How will these features affect the criteria used to judge the fairness of the siting outcome?
- Are there strong forces in some countries that favour the ‘No Site’ option?

6.2. Current Situation (Status Quo)

- How does one characterize the current situation (status quo) with respect to the magnitude of the wastes problem and availability of storage facilities?
- What are the rationales for determining whether there is a need for new sites?

6.3. Trust

- Who has to be trusted in the siting process of your country?
- Is there a large amount of distrust today with respect to institutions involved in siting?
- How can one create trust in your culture?

6.4. Policy Tools

- What are the relevant policy tools that are appropriate for sharing the
burden when siting new facilities?
- What policy tools are appropriate for redistributing benefits between winners and losers?

6.5. Criteria for Judging

- What are the relevant criteria for judging fair siting processes and outcomes in your country?
- How would you characterize a fair process and outcomes in siting a new facility?

NOTES

1. This section is based on material which has appeared in Kleindorfer and Kunreuther (1994).
3. It is possible that informal discussions took place between community officials and the developer to determine whether the facility would be acceptable under a certain set of conditions including some type of compensation arrangement. No public documents were available for us to determine whether this process actually occurred.
4. We could not find any examples of open siting processes with local rights in European countries.
5. For more details on this case see Rabe (1991) and Linneeroot and Davy (1994).
6. The following account is based on personal discussions with Bruno Frey and Felix Oberholzer, 24 May 1994.
7. The grants were divided into three phases. Phase I grants of $100,000 gave the community an opportunity to learn about the technical aspects of high-level waste storage and determine whether there was a real interest in hosting the facility without any formal commitment to do so. Phase II and III grants were for larger amounts and required more focused investigations.
8. The compensation need not actually be paid out. In fact, to be effective the government cannot always redress redistributional inequities, but it must operate with the authority to redistribute wealth and risks (Knessel and Pawlowitz 1992).
9. The well-known Coase theorem in microeconomics suggests that if a facility has large overall benefits for society, but imposes a (lesser) negative externality on identifiable groups, then private negotiation and trades can lead to an outcome where all members of society consider themselves better off with the facility than without it.

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The Public: Client or Decision Maker?


