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## **JAPAN: the success and limitations of technocratic environmental policy<sup>1</sup>**

**Helmut Weidner**

### **Introduction**

The recent prediction that Japan could not be prevented from committing 'ecological hari-kari' (Gunnarsson, 1974) has not been fulfilled although, on the other hand, Japan is still far from being an ecological paragon. The Japanese people had to suffer terrible experiences owing to the effects of environmental disruption and have still to cope with many unsolved problems. In a tremendous effort to mitigate damage to health and the environment in the wake of uncontrolled industrial growth, the Japanese have, however, developed some internationally unparalleled, and, more importantly, feasible and successful political and technical measures that deserve our full attention.

The Japanese have, particularly in the field of air pollution, demonstrated that a drastic reduction in sulphur dioxide (SO<sub>2</sub>) air pollution is achievable within a relatively short period of time and without any appreciable negative economic repercussions. The commonplace excuse 'this may be good for the environment but will not work for the economy' has been clearly refuted. In view of the alarming scale of premature tree deaths in European forests and the acidification of lakes and rivers resulting from long years of an environmental policy which yielded numerous laws and international treaties and conventions but little effective action, it would perhaps be more appropriate to take a good look at the successful strategies and their political setting in Japan instead of pointing to the European countries with the worst records in environmental policy (Wetstone and Rosencranz, 1983; Knoepfel and Weidner, 1985).

Japan, with its advanced pollution control measures and persistent economic expansion, can be seen as a living 'research centre' for other industrial countries — or, as Paul R. Ehrlich once put it: 'Knowledgeable people in other industrial countries will be watching Japan closely,

much as old-time coal miners once watched the canary in the cage' (in Huddle et al., 1975: 14).

This article<sup>2</sup> will mainly concentrate on Japanese air pollution control policy since it is in this field that Japan — compared with other countries — has developed the most advanced abatement technologies and some unique policy instruments whereas most industrialised countries have failed to reach a level of air quality which will not harm nature or human health. Yet at the same time air pollution has become the environmental sector enjoying highest political priority in many western countries (e.g. the Federal Republic of Germany, the Netherlands, Austria, and Scandinavian countries) as is reflected in numerous new and costly air pollution programmes (International Environment Reporter, Vols. 7 and 8).

The article will start out with a brief review of the recent phases of environmental policy<sup>3</sup> in Japan, followed by a description of the basic strategies and instruments of environmental policy. These instruments will be evaluated according to selected criteria including the possibility of 'problem shifts'. Finally, the question of what other industrial nations could learn from Japan will be discussed briefly.

### **Stages of development in environmental policy: from ecological ignorance to technocratic environmental policy**

Japan's progress from ecological ignorance to an active technocratic environmental policy was tortuous, particularly for the Japanese people. There is no other country in which so many diseases and deaths were so obviously attributable to environmental pollution. Many victims underwent acute suffering. A world-wide scandal was provoked by the so-called Minamata and Itai-Itai diseases which were caused by toxic compounds (ie, methylmercury and cadmium) present in industrial waste water and contaminating water bodies and soil. Via the food-chain these toxic substances accumulated in the human body causing severe and often incurable disorders, such as skeletal deformation, an extreme susceptibility to fractures, cerebral damage, spasms, or hearing and speaking disorders. Pollution through arsenic, PCB (polychlorinated biphenyls), and various other pollutants also had dire health effects which were often lethal (Iijama, 1979). PCBs which are widely used industrially because of their favourable chemical and physical properties (eg as insulators in condensers, transformers, etc.) are toxic substances causing liver injuries, chloracne, deformities of bones, etc. By 1973, several thousand victims suffered from these diseases induced by PCB-contaminated cooking oil. The subacute and chronic arsenic poisonings were caused by contaminated milk powder (more than 12,000 infants were affected, 130 of whom died) and emissions of arsenic into the environment by mines. Even breathing became more and more

hazardous: the big cities were enveloped in noxious clouds of factory and car exhausts so that respiratory diseases increased rapidly. Nature too fell victim to the relentless steamroller of industrial expansion: rivers, coastal waters and lakes were transfigured into sewers and whole areas once praised for their natural beauty disappeared under concrete or were mutilated by highways.

To cut a long story short, the impetus for Japan's environmental policy was an ecological crisis unparalleled throughout the industrial world, and present environmental policy in Japan looks back on a long history of bitter struggles. This history can be roughly subdivided into three phases.

### *The phase of ecological ignorance*

Japanese environmental conflicts have a long tradition (Iijama 1979; Tsuru and Weidner 1985). Although periodic controversies occurred in the prewar period, these did not appear to prompt any effective response from the central government.

After World War II Japan evolved a strategy of economic expansion which was particularly orientated towards the highly polluting sectors of industry, such as the iron and steel, and chemical and petroleum industries (Miyamoto, 1981). From 1956 to 1968 production in these sectors increased tenfold. This strategy, along with the indifference to increasingly conspicuous damage to health and nature, paved the way for the severe diseases mentioned above (Itai-Itai, Minamata).

In response to the above-mentioned incidents the Japanese government and the responsible ministries reacted with a classical repressive environmental policy which ignored the ecological aspect (Ui, 1972). When the number of victims increased and the first organised protest occurred, the hypothesis that the diseases were caused by toxic industrial waste water was still officially refuted even to the extent of calling in experts who proved to be biased. The government used all the means within its power to constrain the increasingly militant protests by the people affected, and independent researchers were hampered in their support for pollution victims. Years went by until the cadmium and mercury theory established by upright scientists was finally officially recognised. In the meantime, however, the diseases had already spread to other parts of the country. The government, which was intoxicated with economic growth and indifferent to the environment, took abatement measures only when the evidence could no longer be ignored and when the conflict had nationwide repercussions.

This pattern of policy, ignoring the ecological context of industrial pollution, is also identifiable in other cases (Huddle et al., 1975). However, the above strategy became increasingly threadbare as growing numbers of pollution victims were willing to enter controversies, which

were backed by critical scientists, lawyers, citizen action groups, students of the 'new left' and the mass media. For centuries the philosophy from Prince Shōtoku's constitution of 1604 ('Consensus is praiseworthy and to refrain from opposition is honorable') was revered by the Japanese, but in settling environmental conflicts it came to have less and less meaning. The traditional political and social forces (such as political parties and unions) did not at first support anti-pollution movements, and large sections of the population initially discriminated against pollution victims (Weidner, 1977a), but over time their hostile attitude towards 'victims' groups' and their claims gradually subsided.

This change of attitude towards pollution victims in particular and the consequences of the prevailing strategies for economic growth and industrialisation in general was brought about by various events and developments (Huddle et al., 1975; Tsuru, 1976; McKean, 1981; Reed, 1981; Tsuru and Weidner, 1985), among which the following ones had the greatest impetus:

- (1) Growing evidence of pollution-related diseases: eg the second outbreak of the Minamata disease in Niigata, far away from the region where it had first occurred;
- (2) Negative economic effects of environmental pollution: eg unsaleable fishing catches;
- (3) Increasing awareness of potential negative repercussions of large-scale industrialization (anticipatory self-interest): eg increasing opposition to the siting and expansion of industrial complexes following the experience of cities such as Yokkaichi;
- (4) Gradual erosion of ignorance within the political system: because of the health impacts of industrial pollution, some local authorities including Yokkaichi took to establishing financial aid systems, thus giving environmental pollution official recognition, and — since the city's limited budget was burdened with extra payments — laying the basis to demand reimbursement from those responsible.
- (5) Mobilising effect of the first successful opposition to the industrial development plan. In 1964, a broad citizens' action group had formed in the three small cities Mishima, Numazu, Shimizu in successful opposition against a planned huge petrochemical complex (Nishioka, 1976; Huddle et al, 1975).
- (6) Better coverage of pollution affairs by the mass media.

#### *The phase of symbolic environmental policy*

The conservative central government set out to alter its environmental policy superficially from the 1960s onwards. The machinery of legislation worked overtime to produce what was, in effect, merely a covering for the government's flimsy environmental policy. However, it offered

no protection against those responsible for emissions. This case is not an isolated one: most industrial countries have gone through — or are still going through — similar phases of symbolic <sup>4</sup>environmental policy which yield impressive programmes but poor results. This kind of deficient implementation of control programmes (principles, laws, standards) is particularly evident in the area of air pollution control policy — and not only with respect to national policies of Western and Eastern countries alike (Wetstone and Rosencranz, 1983; Knoepfel and Weidner, 1985; Schreiber, 1984; Godzik, 1982), but also with respect to the activities of international organisations such as the EEC and the ECE (Weidner and Knoepfel, 1981; Prittowitz, 1984).

In 1967, the Japanese government passed a *basic environmental protection law* which laid down the general principles of environmental policy (objectives, strategies, instruments, and authorisations). The subsequent laws and regulations pertaining to single environmental sectors or specific cases had to keep in line with this basic law. Unfortunately, the law also contained a special clause which turned out to be a serious obstacle to the development and implementation of concrete environmental policies. This clause stipulated that the protection of the 'living' environment be pursued in 'harmony' with a sound economic development. This 'harmony clause' was often used by industrial lobbies to prevent strict environmental protection measures and was generally interpreted as being in favour of economic priorities.<sup>5</sup>

This very weak law was followed by a series of equally half-hearted special laws and regulations most of which proved inadequate because of implementation difficulties (Weidner, 1981). They were unable to break up the traditional growth cartel formed by big industry, the leading fractions of the ruling party, and the economy-oriented departments within the ministerial bureaucracy (Pempel, 1977; Watanuki, 1977) and could not steer it in an environmentally less harmful direction. The result was that acute pollution, hitherto restricted to local and relatively small problem areas, spread throughout the country in the course of further rapid industrial growth. This led to the chronic contamination of the entire population as opposed to the acute contamination of the few. In particular, this development applied to air pollution, which was responsible for a great increase in respiratory diseases. But in other sectors, too, the rate of pollution soared. There was almost no inhabited region of Japan in which rivers, lakes, coastal waters or larger areas of land had pollution levels which could be classified as unharmful to health.

The Tokyo Metropolitan Government in its self-critical evaluation of the environmental quality of the city (Tokyo Metropolitan Government, 1971) gives an appropriate description which also fits to the nationwide situation at that time: Japan has become a 'showcase for environmental pollution'. The Japanese people, however, had become

increasingly unwilling to play the parts of mute actors in this ecological drama. Protest actions and lawsuits filed against those responsible for pollution and development projects grew in number. In view of the daily occurrence of photochemical smog, the impressive statistics for GNP growth rates (from 1961 to 1970 c 11%) lost their lustre. According to public opinion polls, more and more people were unwilling to tolerate damage to the environment and to health for the sake of economic growth. Even inhabitants of rural areas, who would have welcomed development measures a short while before, disapproved of all kinds of industrial projects (Environment Agency, 1973, 1982). The slogan of a rural anti-pollution group became nationally famous: 'We'd rather eat rice under blue skies than steaks in smog.'

For quite some time managers of those companies that were responsible for serious pollution-related health injuries had maintained an unyielding attitude towards the relatively moderate demands of pollution victims. In addition, governmental authorities did not support these demands in any appropriate way. So, as a last resort, many pollution victims took their cases to court. This turn of affairs began in 1967 when four lawsuits were initiated which soon became widely known as the 'Four Major Pollution Trials.'<sup>6</sup> The suing parties were strongly supported by 'progressive' or leftist groups in the big cities, by lawyers who in most cases developed close personal relationships with the plaintiffs and began to play a central role in the (extra-judicial) anti-pollution movement, by local politicians, independent researchers, and journalists. All in all, the litigations were closely connected with the general anti-pollution movement which rose rapidly in the late 1960s (Ui, 1972; Kuroda, 1972; McKean, 1981), or, as F. K. Upham (1976: 588) put it: 'The legal action was designed to support the general anti-pollution movement, not the reverse'. As it were, the pollution victims became the centre of the national uprising against pollution because in their fates the moral failure of big business and government institutions was particularly evident:

'Indeed by the late 1960s and early 1970s many Japanese considered pollution that endangered health as a fundamentally immoral act. Against mindless economic growth the average citizen now advanced new concerns: the sanctity of human life, individual dignity, and integrity of local communities. This transformation in values influenced all subsequent judicial and administrative policies' (Gresser et al, 1981: xviii).

It was not only citizen action groups who fought for more rigid environmental protection measures, but also administrators of some highly polluted cities and prefectures who urged the central government to take action. Tokyo in particular was frequently in the front line of



those pressing the government to pass stricter laws. As a form of protest against the government's one-track policy of growth, local or regional administrations issued environmental regulations which were sometimes much stricter than the respective national legislation. And where the legal bases for issuing such regulations were not broad enough, companies were put under political pressure to enter into so-called environmental agreements (Shibata, 1985a). Such contracts fixed environmental requirements that went beyond the stipulations of the national environmental protection law, and, additionally, they proved a pragmatic means for a more flexible consideration of specific local pollution problems. Environmental agreements were not only concluded between companies and local or regional environmental authorities but also between companies and groups of citizens.

It eventually became clear that environmental problems could not be tackled with symbolic policies. In the eyes of the national growth cartel (Kaplan, 1972) the decreasing confidence of the Japanese people in economic growth and their increasing opposition to industrial and public development projects (such as new railroads and highways) posed a threat. It was more and more difficult to find new industrial sites since the conurbations in densely populated Japan offered sparse possibilities for further expansion. Along with the monetary costs (compensations for siting permits and pollutions victims, etc.) 'political' costs also rose: apart from a general loss of trust in the government due to its obvious partisanship in environmental conflicts, support for the ruling party started to crumble (Steiner et al., 1980).

The Japanese government responded with a comparatively radical change in its attitude towards pollution problems thereby initiating some lasting changes in national environmental policy.

### *The phase of active technocratic environmental policy*

During the third, active technocratic, phase of Japanese environmental policy, several very strict measures were taken against important pollution offenders and some internationally unique regulatory instruments were developed. These, added to the considerable increase in private and public investment in environmental protection measures, led to the spectacular improvement of some pollution problems.

The most conspicuous indicator for the beginning of the third phase of Japanese environmental policy was a parliamentary 'tour de force' in 1970. In a special session Parliament (the Japanese Diet) passed a package of 14 environmental laws and regulations. In the course of time, and frequently in reaction to 'environmentally conscious' jurisdiction (see below), these laws have been supplemented and amended, and, moreover, the disastrous 'harmony clause' was abolished.

This marked turn in the environmental policy of the Japanese

government was initiated, and in the following years intensified, by developments in the social, municipal and judicial sectors. The relevant social developments have already been discussed. Municipalities and other local administrative bodies increasingly refused to follow the central government in its strategy of slow and reluctant action and successfully introduced stricter environmental protection regulations in their spheres of responsibility. In doing so they exerted quite some influence on the Japanese government eventually to incorporate these regulations into national legislation. In particular, the coordinated action of several local authorities to force the central government and the motor car industry to restrict car exhausts created a strong public momentum (Shibata, 1985b).

Seven large Japanese cities were especially concerned with the central government's lax attitude towards stricter  $\text{NO}_x$  standards for cars. These cities founded a 'Seven City Panel of Experts' to promote more rigorous limits on car exhaust values with the help of relevant research projects and public relations activities. They also issued bans on the use of motor vehicles for particular highly polluted districts, preferred to purchase cars with low exhaust values for official use and published lists of the 'cleanest automobiles.' This concerted municipal effort was eventually successful: today Japan has the strictest car exhaust standards in the world and since 1975 lead-free petrol is obtainable in any part of the country (Weidner, 1983).

Some Japanese judges, too, were determined to counteract the ecologically depletive economy. It is probably not exaggerating to say that in no other country have court decisions so successfully and favourably influenced environmental policy. Owing to the pioneering decisions in the Itai-Itai, Minamata and Yokkaichi trials (1967–1973), various companies had to pay large sums in compensation to pollution victims, an outcome unprecedented in Japan's legal history. All four trials dealt with civil tort actions and were won by the plaintiffs. The most innovative judicial approaches pursued by the courts in order to cope with the intricate legal problems usually associated with pollution damage (and which, as a rule, serve as a barrier to victims demanding remedies) will only be briefly summarised here because several legal studies have dealt with this matter in depth (eg Gresser et al, 1981; Upham, 1976; Nomura, 1975/76). Most importantly, the courts imposed strict liability for industrial polluters, developed new standards of proof for causation, introduced joint and several ('collective') liability for multiple pollution sources, and shifted the burden of proof to the companies charged with negligence. In the case of 'Yokkaichi asthma'—the industrial city of Yokkaichi was soon nicknamed 'Asthma City' because of its high rate of respiratory diseases—a group of six companies was sued on account of high  $\text{SO}_2$  emissions. Here, judges went particularly far in their interpretation of the law. They

decided that companies should be obliged to pay compensation for health effects even when they could prove that they had observed the legally fixed requirements, since companies should not be exempted from a general 'social responsibility' for their activities. It is perhaps worth while to give here the exact wording of the corresponding passage in the judgment:

'Even if the defendant . . . abided by emission standards, this act only immunizes the defendant from administrative sanction. We cannot say that because the standards were followed, the victims must naturally endure [their fate]' (quoted in Gresser et al, 1981: 121).

The most spectacular judicial innovation was the fundamental change in the *principle of causality*. By adhering to the conventional legal conception it would not have been possible to establish a direct link between detrimental health effects and their causation by the companies accused. The traditional principle of scientifically proven causality, which still predominates in the law of torts and in the environmental law of many countries, calls for unequivocal evidence of a cause-effect relation, which can seldom be produced in connection with normally highly complex environmental problems. Japanese courts have replaced this type of evidence by a more realistic 'legal' proof of causality, ie, if statistical data — usually generated by means of epidemiological investigation — suggest a connection between the occurrence of certain pollutants and certain diseases, then this is evidence enough for courts to enforce measures which include damage awards.

Additionally, plaintiffs were relieved of large parts of the burden to prove the damage-causing source: when it is highly plausible that the toxic substances involved stem from the defendant's plant then it is for him to prove the opposite. The underlying reasoning was the consideration that it is usually impossible for plaintiffs to enter factories to get the necessary information, to conduct tests or to take samples. Much of the impetus for these court decisions probably came from the judges' firm intention to establish a principle of equity in cases of pollution damage, yet the tremendous social pressure exerted by the anti-pollution movement must not be underestimated.

For environmental policy, the overall outcome of these lawsuits was a moral verdict on environmental pollution and a weakening of the hitherto strong position of polluters. Moreover, the government was forced to implement more effective environmental policies, especially in order to prevent a flood of lawsuits against polluters which might easily obstruct an efficient planning and organisation of industrial policy. Therefore, the government's response to this challenge was not restricted to a mere broadening of legislation. Instead, in close cooperation

with the industries affected, the government set up short-term goals for an improved environmental quality and determined the necessary strategies to reach these goals. The main emphasis was put on clean air measures, partly because of their 'noticeable' effects (rapid visibility of environmental political success), and toxic substances (because of their serious health hazards). And, as it turned out, the characteristic relationship between industry, government and bureaucracy in Japan (Pempel, 1977; Johnson, 1982) was able to produce (though not harmoniously) clear decisions and consistent implementation measures. In other countries even the objectives are frequently vague and seldom pursued by the use of effective instruments. In this way, Japan produced its greatest achievements in the most crucial policy areas.

### **Air pollution control measures**

The Japanese have achieved the best results in the field of clean air policy, in particular with respect to SO<sub>2</sub> air pollution.<sup>7</sup> These are summarised below.

These improvements in environmental quality subsequently led to an easing of the tense environmental political atmosphere. They were primarily achieved by supplementary measures to previous activities on the basis of the general environmental protection law. The most important ad hoc measures were a policy of systematic fuel desulphurisation, the enhanced installation of flue gas desulphurising equipment in industrial and power plants (both new *and* old!), clean air programmes on the basis of a so-called total SO<sub>2</sub> emission control system, and the expansion of the public compensation system for health damage through environmental pollution.

### *Technical measures*

In the field of flue gas desulphurisation Japan has taken the world lead. Today about 1,360 units of such facilities are already in operation. This figure demonstrates that a speedy development of pollution abatement technologies is basically dependent on explicit political goal-setting and public pressure. Half-hearted environmental policy decisions relying on an autonomous technological progress in the environmental sector rather perpetuate the lethargic development of the technical 'state of the art'.

Air pollution through lead and carbon monoxide has also been reduced in Japan over the last few years. Nitrogen oxides (NO<sub>x</sub>) which cause respiratory diseases similar to those caused by SO<sub>2</sub> and are also responsible for damage to forests, still pose a major problem. It has not been possible to reduce concentration levels; on the contrary, in some agglomeration areas they have even increased. Nevertheless, the efforts

of the Japanese are remarkable in this field, too. No other industrial country has taken comparable action against  $\text{NO}_x$  air pollution. Once again, the development of appropriate abatement technologies accelerated by environmental policy measures put Japan in a pace-setting position: so-called denitrification plants of an industrial scale can be found — almost exclusively — only in Japan. In 1981 the Japanese already had 175 such facilities. Since 1973  $\text{NO}_x$  emission standards have been tightened up continuously, both for industrial and power plants, for the last time in 1983. Today, Japan's emission standards for  $\text{NO}_x$  are among the strictest in the world.

Japan is also responsible for the sharpest limits for car exhaust values thereby surpassing the previous leader in this field, the USA (Heaton and Maxwell, 1984). Most Japanese passenger cars (all classes) are nowadays equipped with catalytic converters.

A direct positive influence on air quality trends was achieved through energy-related measures. Particularly energy-intensive industries succeeded in drastically cutting down on energy consumption in a relatively short period of time. From 1973 until 1980 energy consumption per unit of GNP had decreased by 22%. Simultaneously, the Japanese government had pursued a 'shrinking policy' with respect to industries that were no longer competitive but that nevertheless consumed large amounts of energy and were responsible for a great deal of pollution (Laumer, 1980).

The Japanese government, prefectures and local authorities also invested enormous sums in monitoring equipment to supervise the effectiveness of laws and regulations and compliance with them. Japan has an almost complete nationwide network of monitoring stations for the most relevant pollutants. Private industries were also forced to monitor their emissions at the sources *and* to submit the data continuously to the responsible public authorities.

### *Socio-economic and legal instruments of environmental policy<sup>8</sup>*

It is not only Japan's technological measures which deserve attention. The national compensation system for damage to health, the total pollutant load control programmes for  $\text{SO}_2$  and  $\text{NO}_x$  as well as the instrument of quasi privately settled environmental agreements are equally exceptional in kind and extent.

Japan is the only country with an extensively regulated *compensation system for damage to health* caused by environmental pollution. The corresponding act of 1973 was the outcome of the conflicts and court decisions related to the four major pollution trials and was influenced by the relief systems (of a much more limited scope) which had been established earlier by several local governments. When the law was drafted even industrial leaders were not fully opposed. With such a

formalised conflict resolution system they expected to improve their image in the public by showing responsibility to pollution victims and, moreover, hoped to avoid a surge of 'uncontrollable' court actions. According to the 'law on compensation for pollution-related health effects' of 1973,<sup>9</sup> compensation must be paid for certain 'pollution diseases' as defined in the law. Persons suffering from these diseases can apply to local authorities for acknowledgement as pollution victims. With such a certification they are entitled to compensation payments. The amount depends on the seriousness of the disease, age, sex, and some other factors. Payments are made, among other things, as reimbursement of medical costs, as index-linked disability pensions, or, in case of death, as the so-called 'money of condolence'.

Victims of environmental pollution are not only entitled to receive compensation when the culprits are known (as in the case of the diseases through toxic chemical substances). The much larger group of people suffering from illnesses or impairments caused by SO<sub>2</sub> *air pollution* are also granted compensation. On the basis of special government decrees, certain regions have been singled out in which a statistically significant coincidence of air pollution and respiratory diseases has been identified. Anybody living or working in these regions for a certain period of time and suffering from specified diseases, such as asthma or chronic bronchitis, *may apply for certification as a pollution victim*.

A particularly interesting feature of the Japanese compensation system is the apportionment of costs. For 'specific cases' (Minamata disease, etc.) the responsible companies have to pay, but for 'non-specific cases' (air pollution induced diseases) caused by multiple sources approximately 80% of the compensation costs is covered by the contributions paid by companies into a fund according to their SO<sub>2</sub> emission amounts. The administrative overhead to determine the amount of contributions is relatively low owing to a very simple and pragmatic procedure: emissions are calculated on the basis of the sulphur content of the relevant fuels and the amount of fuel actually used; a special bonus is deducted when abatement measures are taken. Companies operating in polluted areas have to contribute much more than those in other regions. This system of 'emission fees' has, in fact, worked as an incentive for polluters to reduce their SO<sub>2</sub> emissions both in the industrial and in the power plant sectors. Car owners, too, must contribute to the compensation fund: about 20% of the cost is covered by means of an automobile weight tax.

What is most impressive about this compensation system is that the Japanese have come up with a simple and pragmatic solution to a highly complicated problem. Nevertheless, there are still some implementation and other problems which have provoked criticism in Japan, the main one being that the certification procedure for specific cases takes too long and is too rigid, ie, some medical cases have been unjustifiably

rejected as being pollution-related. By the end of 1982 87,648 medical cases had been officially acknowledged, 85,581 of which were respiratory diseases. It is, however, estimated that the actual number of pollution victims is much higher. That the amount of compensation granted is often insufficient is a further criticism. Shortly after the system had been implemented industry, too, began to attack it in several aspects (KEIDANREN, 1976; Miyamoto, 1983). They not only argued that the scientific bases for the designation of areas were ambiguous, but also questioned the selection of  $\text{SO}_2$  as the leading indicator for respiratory diseases. In particular, they vehemently attacked the cost allocation system for being unfair in principle: although  $\text{SO}_2$  emissions had decreased drastically, the burden of pollution levies had continuously increased owing to the growing number of certified pollution victims. There are two contrary explanations for this development. On the one hand, it was contended that pollution-related health injuries often become manifest only after a longer latent period. On the other hand, industrial organisations, headed by KEIDANREN (Federation of Economic Organisations in Japan), claimed that many people participated in the compensation system whose ailments had other causes (eg, automotive air pollution or smoking). There are more or less convincing arguments for both opinions. The debate on these and other issues related to the compensation system is complex and highly politicised, the outcome still being unclear. Yet it seems to be certain that it will result, at the most, in modifications, and not in the abolition of the system.<sup>10</sup>

This Japanese compensation system has social and political repercussions that go beyond the individual cases. They have to do with its mobilising and legitimising functions and the establishing of a social *group* of many anonymous *individuals* who had been isolated in their misery. Now that claims for compensation had been politically and socially legitimate, pollution victims who had hitherto been afraid of public repercussions were also encouraged to fight for their cause.

In addition the growing number of applications for compensations effected more intensive scientific investigations into pollution-related health hazards. Until then, mostly 'outsiders' of the Japanese scientific community had undertaken critical research in spite of their colleagues' open hostility (Ui, 1985).

In view of the present revival of concern about health effects (as well as damage to buildings, forests and lakes) through  $\text{SO}_2$  air pollution and acid rain in European countries, a more intensive consideration of the Japanese compensation system could be most helpful, especially because the air pollutant  $\text{SO}_2$  with its multiple sources has a central role within that system.<sup>11</sup>

Clean air programmes on the basis of the so-called *total emission control system* have been equally disregarded in spite of the good results

achieved in Japan. The basic aim of this system is the reduction of SO<sub>2</sub> emissions in highly polluted areas as specified by the central government. The prefectural governments of these regions are called upon to work out special programmes fixing the envisaged reduction in emissions and the respective time limits for achieving these reductions. On the basis of these programmes the permitted amount of SO<sub>2</sub> emissions is individually determined for each of the larger industrial plants. For practical reasons, this procedure is not applied to smaller factories; these must simply use fuels with sulphur contents not exceeding the legal limit.

Larger companies are free to decide which emission abatement measures they wish to apply to which specific emitting facility as long as they keep within the stipulated emission limits. Thus they are granted a relatively large measure of freedom to choose the most convenient means for the implementation of government directives. This strategy serves the principle of putting more political effort into programme formulation in order to reduce the bureaucratic costs during programme implementation. Meanwhile, this strictly emission-orientated concept is applied in 24 areas where—compared to the situation around 1970—considerable decreases in SO<sub>2</sub> emissions have been achieved.

Regional air quality management is usually a rather complicated task in industrialised areas with many old emitting facilities. And, correspondingly, the Japanese system is a rather complex one. This does not only apply to the organisational aspects of management but also to its more technical features, such as the calculation of emission levels assuring the envisaged ambient air quality on the basis of sophisticated formulas and wind tunnel experiments (Weidner, 1985). Encouraged by the success of this approach in the field of SO<sub>2</sub> air pollution, the total emission control system was applied to NO<sub>x</sub>, too. In 1981, it was introduced, for the time being, in three congested urban areas. Here, however, the envisaged ambient air quality standards could not be reached within the set period of time (April 1985) because automotive air pollution could not be sufficiently controlled.<sup>12</sup>

Beyond governmental regulations the environmental political system leaves plenty of latitude for direct negotiations between prefectural or municipal administrations and companies on the one hand or between citizen groups and companies on the other to conclude quasi gentlemen's agreements on environmental protection measures which, as a rule, are much stricter than required by law (JELRI, 1984). Such agreements are quite commonly regarded as an appropriate means to supplement the national environmental protection law according to local or regional needs. Currently there are more than 23,000 of these agreements and the trend is still upwards.

These pollution prevention agreements address nearly all aspects



relevant for pollution control, eg, standards and regulations for all environmental media (air, water, soil), the use of raw materials and fuels, abatement technologies, monitoring, etc. Recently, agreements have increasingly been concluded which restrict operation under unfavourable environmental conditions and provide for compensation for pollution-induced damage, liability without negligence, unannounced inspections or sanctions in case of violation of agreements. The duration of agreements is quite frequently limited so that they can be updated in accordance with technological progress.

It may come as a surprise that Japan had no legal basis whatsoever for such agreements. It was just by way of 'extra-legal', political power that local governments and anti-pollution groups 'persuaded' polluting firms to make concessions. Local governments, for example, delayed licensing procedures by being overly 'bureaucratic', took an uncooperative position in questions of infrastructural projects (road construction, sewerage connection, etc.), or, even more spectacular, cut off industrial plants from municipal water supply.

There is no doubt among Japanese experts that pollution prevention agreements and similar anti-pollution guidelines and regulations issued by local authorities had a strong, perhaps the strongest, influence on the development of environmental policy in Japan (Weidner et al, 1986).

#### *An evaluation of air pollution control policy: the limitation of a technocratic policy*

More recent studies on approaches to and methods for the evaluation of environmental policy (eg Schneider and Sprenger, 1984) have pointed out at least four crucial issues as being particularly essential for an assessment of environmental policies:

- (1) *effectiveness*: While earlier studies often assessed environmental policy on the basis of governmental programmes of action (including laws, regulations, standards, etc.), studies in implementation research (eg, Bardach, 1977; Barrett and Fudge, 1981; Mayntz, 1980, 1983; Knoepfel and Weidner, 1982) drew attention to policy enforcement and the actual effects on environmental quality.
- (2) *efficiency*: In the face of current financial constraints on public budgets and a general economic stagnation, the consideration of pollution abatement costs and related administrative expenditures has gained tremendous weight in the environmental debate (OECD, 1984; Schneider and Sprenger, 1984).
- (3) *equity*: The distributional impact of environmental policies has always been a concern, raising the question of whether middle and upper income groups support environmental concerns primarily in order to defend their own interests (protection of 'positional goods') while the poor have to bear the bulk of the costs for

environmental protection (Stretton, 1976; Schnaiberg, 1980; Schnaiberg, 1986).

- (4) *prevention*: Both theoretical studies (McHale, 1970) and experience with the results of environmental policies have drawn attention to the fundamental shortcoming of existing policies, namely that they are reactive rather than anticipatory and preventative (O'Riordan, 1985; European Community, 1983; OECD, 1984).

Although these four criteria are considered essential to any full evaluation of environmental policies, due to limited space we will elaborate only on the fourth (prevention), which is most pertinent to this paper's concern with limitations of the Japanese approach.

### **'Anticipate and prevent' versus 'react and cure'**

Conventional environmental policies are basically reactive, *ex post* policies. The emphasis is on the restorative aspect after an environmental disaster has occurred. The deficiencies of such an approach are well-known: nature and human health have been seriously harmed, often irreversibly, whilst the economic costs of remedies are higher. In relation to equity it should be noted that reactive policies mostly adhere to the taxpayer pays principle instead of the polluter pays principle, especially when emergency situations have occurred.

So, there are many good reasons to develop environmental policies on the basis of an anticipate-and-prevent approach. This does not imply simply the avoidance of problems in one environmental medium (air, water or soil), but calls for a long-term policy giving due consideration to the whole 'ecological context'. This is, admittedly, a rather difficult task not only from a theoretical point of view but also from an institutional and political one (O'Riordan, 1985). In several studies (McHale, 1970; Mayer-Tasch, 1974) it was pointed out that insufficient consideration of the ecological context and the long-term effects of pollution is characteristic of most environmental policies because of their prevailing strategy of *peripheral and selective* intervention.

Intervention is selective when the environmental political focus is only on one part of the ecological context in which damage has become manifest and when remedial activities are limited to that part, ie, dealing incrementally with air, water, soil, etc. pollution with medium-specific policies without a systematic coordination of these policies. A *peripheral* intervention is defined as a policy which does not tackle the cause of a pollution problem in an attempt to eventually overcome it but instead simply 'manages' (mitigates) pollutants or controls the last link in a chain of events. In the field of air pollution control, for example, this could be the abatement of harmful emissions by dilution (eg, tall smoke-stack dispersion policies) or aggregation (eg, end-of-pipe technologies such as desulphurisation plants) instead of pursuing energy saving

measures, thereby producing less pollutants from the very beginning, or introducing structural changes towards modes of production and consumption which would be ecologically sound.

A strategy of selective and peripheral interventions may achieve short to medium-term improvements, but progress will soon slow down and new problems emerge. There are at least two reasons for this development: first, the ongoing *accumulation* of residual pollutants caused by the structurally unaltered sources of problem generation is not prevented, especially when economic growth offsets the positive effects of abatement measures, which rarely achieve 100% success (Jänicke, 1985), and secondly, pollution problems are constantly being *shifted* from one environmental medium to another.

There are various forms of such an environment-related 'problem dislocation' which must be given special consideration in evaluation studies (Weidner, 1977b; Knoepfel and Weidner, 1983a). 'Problem dislocation' can be classified in the following way:

- (1) *Medial problem dislocation*: Environmental problems are shifted from one medium to another, eg from air to water or soil. Dust collectors, for example, reduce air pollution at the expense of higher water or soil pollution when dusts are recklessly disposed of.
- (2) *Spatial problem dislocation*: One region is 'cleaned up' at the expense of others, eg, air quality in urban agglomerations is improved through long-range distribution of pollutants.
- (3) *Temporal problem dislocation*: Environmental problems are spread over a lengthy period of time, eg, the concentrations of pollutants in the ambient air are being diluted thus avoiding immediate and acute health injuries. This may create a short-term mitigation of critical problem situations, yet, the continuous and long-term exposure to pollutants induces chronic diseases (or impairs well-being) which become noticeable relatively late and are then difficult to trace back to their actual causes.
- (4) *Problem dislocation caused by substitution measures*: Industrial processes, raw materials, fuels, etc., are substituted by others (sometimes in response to environmental policy decisions) which may pollute the environment to the same or even to a greater extent, eg switching from fossil fuels to nuclear power or substituting phosphates in detergents, which contribute to the eutrophication of water bodies, for the chemical substance NTA, which may wash out heavy metals from river and lake sediments.

With the term *technocratic* environmental policy I refer to policies which achieve impressive temporary alleviations on the basis of concrete political intervention but 'systematically' create the long-term deficiencies mentioned above.

## Evaluation of Japan's achievements in environmental policy

### *Pollution trends*<sup>13</sup>

The achievements of Japan's SO<sub>2</sub> air quality control policy are impressive. The SO<sub>2</sub> concentration in ambient air had been extremely high and annual averages sometimes lay far above 150 µg/m<sup>3</sup>. These concentrations were reduced relatively quickly, largely owing to special measures to lower emission levels. Between 1970 and 1975, SO<sub>2</sub> emissions in the industrial and power generating sectors decreased by more than a half. Today, 99% of Japan's 1,590 monitoring stations measure SO<sub>2</sub> values far below the national ambient air quality standard for SO<sub>2</sub>, whereas in 1973 the figure was a mere 4%. A considerable level of pollution abatement was equally arrived at for carbon monoxide (through rigid emission standards for cars) and lead (through the nationwide introduction of leadfree gasoline). Today, 90% of cars are fuelled with leadfree gasoline. Success is not so apparent with respect to suspended particulates: concentration levels are still far from reaching the required national environmental standard, although since 1980 considerable progress has been made. The NO<sub>x</sub> air pollution level has been almost stable since 1974. However, at 30% of the installed monitoring stations NO<sub>x</sub> values still exceed the national standard. NO<sub>x</sub>, along with hydrocarbons (HC), is also responsible for *photochemical smog*. Between 1973 and 1982 smog warnings and registered health effects have decreased considerably but recently an upward trend has been observed, particularly in the large conurbations of Tokyo and Osaka.

The amount of industrial and domestic *waste* has also increased continually and waste disposal sites are sparse in densely populated Japan. With respect to toxic substances, the rigid control measures have led to a notable reduction of these substances in water bodies, and hazardous pollutants such as arsenic, PCB, lead, cadmium or mercury are nowadays very rarely detected in lakes and other waters. On the other hand, water pollution with organic substances is on the increase. The main reason for the bad water quality is Japan's long neglect of sewage systems and waste water treatment (only 31% of the population are connected to sewage networks.) Although now subject to major new investment, this area provides examples of problem-shifting. Pollution is also still present in the *soil*, owing to the lack of effective legislation against the dumping of chemicals prior to 1973.

*Noise and vibration* constitute the main public complaints relating to environmental deterioration (about 40% of all complaints in 1982). The main reason for complaints is traffic noise, in particular through trucks and express trains. There is increasing concern about health effects of 'inaudible noise', ie low-frequency vibrations caused by automobiles or trains running over vibratory overpasses.

Japanese cities have grown almost unrestricted under a very rudimentary land use and town planning policy (Schwind, 1980; Glickman, 1979). Parks and other recreational land have been reduced in extent, (eg in Osaka by 10% between 1970 and 1980.)

As the above outline shows, there is still much to be done with respect to Japanese environmental policy; success is slowing down even in areas of achievement, and there are new challenges with which to cope. As regards SO<sub>2</sub> pollution, there have been few further improvements in recent years and the existing policies have come under some economic and political challenge.

### *Efficiency and equity*

Compared to Western industrial countries, the debate on the economic effects of environmental policy (eg, on the employment situation, growth rates, export business or inflation) has had only a marginal role in Japan. Accordingly, studies on such effects are scarce.

Environmental policies (including industrial policy measures aimed at energy and resource saving) and anti-pollution expenditures 'appear to have been fairly efficient' (OECD, 1977: 67). Moreover, a tentative assessment of the macro-economic consequences of environmental policies comes to the conclusion 'that the impact of relatively high pollution abatement costs on macro-economic magnitudes, such as GNP, employment, prices, and foreign trade, is practically negligible' (OECD, 1977: 87). Some Japanese experts even went a step further when they stressed that anti-pollution policies exerted a favourable influence on industry, helping to overcome the two oil price crises in the 1970s and securing the continuation of the 'Japanese economic miracle' (Ui, Miyamoto, in Tsuru and Weidner, 1985).

Even though it is generally very difficult to assess the effects of environmental policy on *equity*, in the case of Japan equity was furthered by anti-pollution measures. From the outset, those groups suffering most from pollution generally held a very weak position in society, ie the old, the young, the ill and the poor (Miyamoto, 1983: 5ff.). Furthermore, the basic principles of the court decisions and the administrative system of compensation have substantially strengthened the power position of these groups (see above). However, there still are many disparities, especially with regard to the preservation of the natural environment *per se*. Here, there is insufficient basis for litigation against public development projects (eg motorways, airports, railroads) to prevent damage to the natural environment. Environmentalists have developed a concept of an 'environmental right', but this concept has not found favour with the Japanese judiciary.<sup>14</sup> Government has also successfully resisted the enactment of a law on environmental impact assessment (Japan Environment Agency, 1985).

Opposition is mainly directed towards attempts to broaden the rather limited approach of avoiding damage to health into an active policy of preservation and improvement of environmental quality and amenity.

### *Prevention versus anticipation*

Although much has been done to prevent, or create disincentives to, pollution, a preventative environmental policy *per se* does not yet exist: 'Japan has won many pollution battles, but has not yet won the war for environmental quality' (OECD, 1977: 83).

In its 1983 report on environmental quality, the Japanese Environment Agency draws an almost identical conclusion and calls for a more integral approach in environmental policies with a broader consideration of the requirements of the ecosystem. It even speaks of a 'mission' in which we should see to it that nature, both priceless and finite, be handed down unadulterated from generation to generation (Environment Agency, 1983: 40). It is obviously a difficult task to fulfil this postulate, but nevertheless it is a 'notion' which may provide a basis for the analysis, evaluation and planning of environmental policies.

### **The Japanese approach: technocratic environmental policy**

In spite of the general ecological shortcomings of environmental policies in all industrial countries an international comparison none the less reveals some distinct differences. For example, unlike many industrial countries, Japan has established quite unconventional regulatory instruments, with great emphasis on technological innovation, and has now taken the lead in many fields of environmental technology. Furthermore, because of its technological progress Japan has, to an astonishing extent, succeeded in alleviating severe pollution-related problems. All this has been achieved on the basis of a kind of policy which I refer to as *active technocratic environmental policy*.

The difference between an *active technocratic environmental policy* and other forms of environmental policy, equally indifferent to the overall ecological context, can be characterised by the following features:

- (1) In the development of concrete pollution control measures, the emphasis is on technical feasibility rather than on the legal bases for such measures.
- (2) For selected problem areas stringent goal-means relations are set up and, moreover, the goals to be reached are very explicit and not intentionally vague.

It is noteworthy that in Japan the legal basis for the formulation of environmental policy measures is often less precise (formalised) than in other countries, yet nevertheless these objectives are a far greater impetus for action. This may be so because the actors involved (as a rule

representatives of administration and industry) are willing to strive for objectives once they have been mutually agreed upon, regardless of whether they are legally enforceable (OECD, 1977: 26).

- (3) To achieve environmental policy objectives a short, and sometimes medium-term deadline is envisaged, and implementation is strictly supervised, eg, by a comprehensive and sophisticated monitoring system.

An environmental policy bearing these three features is called here *active technocratic*, and not simply effective, policy, since it adheres to technocratic approaches and shares their limitations: policies which pursued transcending problem solutions would have to deal more directly with the causes of problems.

Thus, Japanese environmental policy remains an intrinsic part of the political system, which is still dominated by a power coalition consisting of big industry and the most influential factions of the ruling party and bureaucracy, and pursues an economic growth policy based on industrial expansion.

What makes Japan so remarkable and outstanding is the mere fact that other industrial countries have not yet reached the same level of activity in their — likewise technocratic — environmental policies (OECD, 1985). Japan is one of the few countries to have succeeded in alleviating massive environmental political conflicts, which otherwise would have had far-reaching consequences for industrial policies, by taking effective pollution abatement measures compatible with the economic and political system. Anti-pollution protests, which had a tendency to grow into an anti-industry movement, posed a challenge that was quite unusual for the Japanese political system. This challenge and the impending danger of mushrooming litigations against all sorts of industrial pollution have been channelled into surveyable and 'manageable' procedures.

A great deal of latitude previously attained by local governments and citizen action groups still remains: above all the possibility to conclude pollution control agreements with industries — an effective strategy for pollution abatement which is not state-controlled. All in all, one might say that the pollution disputes, in general, have had a favourable effect on Japan's democracy: committed citizen action groups have gained more rights to participate in decision-making processes of vital public concern and local authorities have attained more influencing control, thus softening the prevailing authoritarian centralist policy (McKean, 1981; Pempel, 1977).

On the other hand, the visible success of environmental policy has eventually led to a decrease in environmental activities of citizens and local authorities. There are still some relevant groups calling for a genuine environmental (conservation) policy, but compared to former

times they are less in number and also less active (Ui, in Tsuru and Weidner, 1985).

### **Can anything be learned from Japan?**

Japan's efforts in pollution control lead to an ambivalent assessment. From a long-term, ecological perspective their success was only limited because of their negligence of the environmental context and the 'new problems' that arose from established pollution control activities. On the other hand, Japan has reduced pollution loads harmful to health and property at a pace and to an extent apparently not achieved by any other nation. This ambivalent result can be explained with the Japanese technocratic approach of selective and peripheral interventions which — by ignoring the ecological context — are effective in the short run but fail to substantially tackle environmental problems.

In addition to this more general experience which can be drawn *in concreto* from the results of Japan's advanced technocratic environmental policy, the following aspects may be of basic interest from a comparative angle:

- (1) Evidently, there are much more feasible pollution abatement techniques available than industries and responsible authorities in other industrial countries usually admit. Not long ago, it had been officially averred, eg in Great Britain and West Germany, that there were no suitable facilities for flue gas desulphurisation or denitrification (ECE, 1980; Weidner and Knoepfel, 1984). An observer of the very recent discussion on the introduction of stricter car exhaust regulations might have experienced vivid *déjà vu* listening to the arguments brought forth by industry and politicians. The Japanese example clearly demonstrates that technological progress can be decisively accelerated when emitters are put under political pressure. Furthermore, decisions on pollution abatement measures in particular cases (eg permit issuing) may be influenced in other countries by pointing to tested and applied techniques in Japan. There is an important role for empirical information on practicable abatement devices in situations of conflict (Blowers, 1984).
- (2) The substantial participation of the public proved to be fundamentally important for enhancing pollution control programmes. We can learn that comprehensive, reliable, and continuous information on all relevant environmental aspects (damages, emissions, environmental quality trends, etc.) is a prerequisite for the development of an unbiased, non-manipulated environmental consciousness and for a substantial participation of the public. Furthermore, reliable and problem-oriented monitoring data are a basic requirement for the preparation of rational pollution abatement programmes and also an important means for the general public to



evaluate the achievements in environmental protection. In most EEC countries the means for public information on environmental issues are still in their infancy.<sup>17</sup> Compared to other nations the system of environmental monitoring and reporting in Japan has reached a high standard and is far better established.

- (3) For meaningful participation it is also necessary to have legal provisions for affected citizens or environmental interest groups to influence government policy and the behaviour of emitters or to seek remedy for damages caused by pollution through court action. In EEC countries restrictive legal doctrines often preclude court action by concerned citizens and environmental organisations. In cases of actual or potential damage the burden of proof rests with those affected. They have not only to prove the cause-effect relationship but also the particular pollution source responsible for this. In complex cases such as damages through air pollution it is almost impossible to meet these requirements. It is no exaggeration to say that the dogmatic legal principles applied to environmental conflicts are mostly to the benefit of those polluting the environment. The Japanese experience shows that in order to create some kind of 'parity of weapons' for those affected by pollution it would be most important to reverse the burden of proof and to introduce clauses of strict liability. With respect to cause-effect relationships it would be equally important to apply principles of plausibility and to accept statistical (or epidemiological) evidence.
- (4) Finally, we can learn from the Japanese that when the social pressure to take environmental protection measures subsides government and industry soon slacken their efforts. This mechanism supports the introduction of more economic and flexible instruments into environmental policy in order to increase the incentives for emitters to do more for the environment more effectively. For that aim it would be very useful to draw upon Japan's experience with instruments such as the strict liability clause, SO<sub>2</sub> fees and pollution control agreements. On the other hand, environmental policy is also basically a question of administrative action or inaction. Therefore, considerations of how to create more incentives should not neglect the administrative system. What can be done to incite the responsible authorities to do more than is required by law? Aside from the point that, arguably, there is a lack of basic research on this problem in general, the Japanese example, again, may provide some simple answers. What we need is an increased transparency of administrative achievements (eg through a better environmental monitoring and reporting system), instruments such as pollution control agreements and a strong public concern for the protection of the environment.

## NOTES

1. Translated from the German by Dagmar Kollande and Astrid Rea.
2. I am indebted to Michael Hill and especially to Andrew Blowers for stimulating and helpful comments on a former version of this article. Any remaining errors and omissions are entirely my responsibility. This article is a revised and expanded version of my article 'Erfolge und Grenzen technokratischer Umweltpolitik in Japan' published in *Aus Politik und Zeitgeschichte B* 9-10/1984, pp. 31-46.
3. The Japanese usually distinguish between pollution abatement policy (anti-kōgai policy) and environmental protection policy. The former refers to conventional pollution abatement policies whereas the latter includes nature conservation and amenity. In this article these terms are not strictly separated.
4. For general information on the theory and function of symbolic politics see Edelman, 1964.
5. An English translation of the complete text of the basic environmental protection law is published in Japan Environment Agency, 1984: 1-8.
6. The following cases are covered: the Itai-Itai disease in areas along the Jinzu River (Toyama Prefecture); the Minamata disease in the Minamata area (Kumamoto Prefecture); the Minamata disease along the Agano River (Niigata Prefecture); and the respiratory ailments and lung diseases in the Yokkaichi area (Mie Prefecture).
7. The official ambient air quality standard indicates the level of SO<sub>2</sub> concentration in the ambient air which is presumably not harmful to human health. It is not a statutory standard but serves as a guideline for environmental policy. In Japan the daily average of hourly values shall not exceed 0.04 ppm (110 µg/m<sup>3</sup>). The corresponding standards for carbon monoxide and suspended particulate matter are 10 ppm and 0.10 mg/m<sup>3</sup>, respectively. For nitrogen dioxide the daily average of hourly values shall be within the range of 0.04 and 0.06 ppm or below. For photochemical oxidants the hourly values shall not exceed 0.06 ppm.
8. This section refers only to those policies which are unique in international comparison and which have proved to be particularly effective. For a comprehensive description of Japanese environmental policies and organisational arrangements see Gresser et al., 1981, and Weidner, 1981.
9. A full-length English translation of the law and the enforcement order on compensation for pollution-related health effects is published in Japan Environment Agency, 1984: 13-69.
10. This assessment is based on my numerous interviews of Japanese scientists, representatives of environmental and industrial interest organisations, and of public authorities at the state and local level in March and April, 1985, in Japan.
11. For the German discussion on this issue cf. the leading article in the weekly magazine *Der Spiegel*, January 9, 1984, 'Saurer Regen schädigt auch Kinder und Kranke' (Acid rain also harms children and the sick). Japanese investigations have also shown relatively unequivocally that particularly the elderly and children are affected by air pollution. In the industrial city of Kawasaki, for example, they make up about 60% of the patients with respiratory diseases (cf. *Neue Zürcher Zeitung* of July 22, 1982). In Tokyo as early as 1975, parents of more than 8,700 infants received subsidies towards the cost of health care because their children had suffered from diseases caused by air pollution (cf. Tokyo Metropolitan Government, 1977: 199).
12. Interview given to the author at Japan Environment Agency in April, 1985.
13. For this section official environmental reports and, in particular, Japanese newspapers printed in English have been evaluated. In addition, interviews were held with representatives of the responsible authorities at the state and local level in March and April, 1985. The presentation had to be kept short here owing to the limited space.

14. Based on interviews with Japanese legal experts in March and April, 1985. Cf. also Awaji in Tsuru and Weidner, 1986 (in preparation).
15. The study was mutually funded by *Deutsche Forschungsgemeinschaft* and *Stiftung Volkswagenwerk*. Cf. Knoepfel and Weidner, 1985 (in press).
16. Based on interviews with representatives of local authorities in March and April, 1985. Cf. Weidner, 1985.
17. This does not only apply to data on damages, emissions from stationary sources and environmental quality trends, but also — and particularly in this connection — to information on control activities of the responsible authorities. Compared to other EEC countries, the Netherlands have the most 'open system' with respect to public access, whereas Great Britain presumably has the most 'closed system'. Cf. also the current debate on freedom of information promoted by the British Freedom of Information Campaign which, as yet, has no counterpart in West Germany.

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