MARKET INSTRUMENTS AND CONSUMPTION AND PRODUCTION PATTERNS

By

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Introduction

Consumption levels and patterns have emerged as a major concern of both the environmental movement and of social reformers. Environmentalists regard the high and growing consumption levels of advanced countries and their composition as a major cause of resource depletion and environmental degradation. Simple linear extrapolation of these consumption patterns and levels enjoyed today by 15 percent of the world population, to the remaining 85 percent results in resource consumption and pollution levels that are untenable. Those concerned with inequality and poverty in the developing world see the "profligate" consumption levels and patterns in the North as the root cause of the persisting underdevelopment and poverty in the South. The implication is that development is a zero-sum game: raising the standard of living in developing countries requires concomitant reductions in developed countries.

As shown by Vincent and Panayotou (1997), the concern with consumption levels per se is misplaced, since both environmental quality in the North and opportunities for growth in the South improve with economic growth and private consumption. There appears to be no inevitable tradeoff between private consumption and environmental quality or resource availability. The concern with consumption and production patterns, on the other hand, is very much justified, but both the causes (economic growth, trade liberalization, globalization, etc.) and the remedies (capping consumption levels) are misplaced.

The fundamental reason for socially suboptimal consumption and production patterns (and even levels) is the underpricing or mispricing of natural resources (materials and energy) and intermediate and final products and services, including environmental services. A combination of institutional, market and policy failures results in underpricing of scarce natural resources and environmental assets, which is then translated into underpricing of resource-based and environment-intensive goods and services. Institutional failures, such as insecure property rights, market failures such as environmental externalities, and policy failures such as distortionary subsidies drive a wedge between the private and social costs of production and consumption activities. As a direct result, producers and consumers of products and services do not receive correct signals about the true scarcity of resources they use up or the cost of the

environmental damage they cause. This leads to the socially wrong mix of economic output: over-production and overconsumption of commodities that are resource-depleting and environment-polluting (such as fossil fuels) and underproduction and underconsumption of commodities and services that are resource-saving and environment-friendly. This is the direct implication of scarcity: if too many resources are used in the production and consumption of environmentally harmful commodities, too few resources are left to be allocated to socially beneficial activities such as education, health, environmental protection, and conservation of resources for the future. The emerging pattern of economic growth and structure of the economy is one that undermines its own resource base and is ultimately unsustainable, since relative scarcities are not respected.

An example of the extent of the underpricing of economic activities is provided by road transport in Europe, where estimates of external (unaccounted and unpaid) social costs range between a low of 1.1 percent GDP in Switzerland to a high of 9.8 percent of GDP in Portugal (see Table 1). For the US, estimates range between 2.1 percent and 12.3 percent of GDP. On the average, social costs equivalent to at least 4 percent of GDP were not paid by users who, as a result, were encouraged to make excessive and wasteful use of road transport. Private cars were the most underpriced mode of road transport and correspondingly the most environmentally damaging.

Full-cost pricing of resources, goods, and services requires that all costs, present and future, internal (private) and external to the user which are incurred by society during production and consumption are incorporated and fully covered by the price of the good or service. All real resources with alternative uses, current and future, used up in the production or consumption of a commodity must be reflected in its price in order to avoid resource overproduction and/or overconsumption, resource depletion and environmental degradation. In a market economy, relative prices are the only signals of relative values that drive resource allocation: underpricing some commodities and overpricing others conveys wrong signals and perverse incentives and results in wasteful use of scarce resource; in a world of scaricty, waste is incompatible with sustainable development.

Table 1: Estimates of the total external costs of road transport (in billion ECU)

Country	(year)	Cars	Buses	Motorcycles	Freight	Total	Total (%of GDP)
Europe 17 incl. Norway and Switzerland	1991	164.2	9.1	20.9	56.4	250.6	**4.2**
Austria	1991	4.9	0.2	0.5	1.0	6.6	**5.0**
Belgium	1991	6.5	0.2	0.6	1.3	8.7	**5.4**
Denmark	1991	2.1	0.2	0.4	1.0	3.4	**3.2**
Finland	1991	2.2	0.2	0.2	0.7	3.3	**3.3**
France	1991	22.8	1.2	1.8	15.0	40.8	**4.2**
Germany	1991	45.8	1.7	5.0	9.4	61.9	**4.5**
Germany (a)	1994	< 8.8	to	24.6	1.9-9.9	10.7-34.5	**0.8-2.5**
Greece	1991	1.7	0.3	0.2	1.0	3.2	**5.6**
Ireland	1991	1.0	negligible	negligible	0.5	1.5	**4.2**
Italy	1991	19.7	1.6	6.8	6.7	34.8	**3.8**
Luxembourg	1991	0.2	0.01	0.02	0.07	0.3	**4.0**
Netherlands	1991	5.3	0.2	0.5	1.9	7.9	**3.3**
Netherlands (b)	1987						
Netherlands (c)	1990	2.9	<	0.7 >	1.3	4.9	**2.2**
Norway	1991	1.6	0.1	0.2	0.4	2.3	**2.7**
Portugal	1991	4.2	0.3	0.5	0.4	5.4	**9.8**
Spain	1991	11.8	1.2	1.4	6.3	20.7	**4.9**
Sweden	1991	3.8	0.2	0.6	1.0	5.6	**3.0**
Switzerland	1991	3.8	0.1	1.0	0.8	5.7	**3.1**
Switzerland (d)	1992					2.0	**1.1**
UK	1991	26.6	1.5	1.4	9.0	38.5	**4.7**
UK (e)	1991					30.0	**3.7**
USA (f)	1992?					110	**2.1**
USA (g)	1994					(US$) 778	**12.3***

*This figure is much higher than the others because more externalities are taken into account.

Source: INFRAS/IWW 1994 except where noted:

(a) Friedrich 1994
(b) van der Kolk 1987
(c) Bleijenberg 1994
(d) Jeanreanaud 1992 (Accidents, noise and air pollution damage to buildings only. Estimate of 7.7. Swiss centimes per vehicle kilometre multiplied by 50.3 billion vehicle km = 3.87 billion CHF.
(e) Pearce 1993
(f) Mackenzie 1992
(g) Litman 1994

Reproduced from European Environment Agency (1996).

To reinstate optimal production and consumption patterns, we need to move from underpricing to full-cost pricing through the removal of institutional, market and policy failures: distortionary subsidies must be eliminated, secure property rights established, and externalities internalized. Market-based instruments, when appropriately set to equal the unaccounted incremental opportunity costs, are ideal tools for internalization of omitted social costs and of restoration of efficient relative prices.

The key to the premise of economic instruments is their ability to harness the power of the market and the self-interest of the individual and to turn these presumed adversaries of sustainable production and consumption into powerful allies. This is done not by mandated or prescribed actions but by changing the incentive structure facing consumers and producers and by taking advantage of their self-interest and superior information. Economic instruments, such as pollution charges and taxes, auctioned tradeable permits and user fees also raise large amounts of revenues that can be spent on public goods which improve environmental quality or used to reduce distortionary taxes that discourage work and savings or distort consumption decisions.

The present paper reviews the use of market-based instruments and other incentive-based regulations to modify consumption and production behavior towards more sustainable patterns and levels. The term "market instruments" is interpreted broadly to encompass all non- command and control regulations including suasive instruments, voluntary agreements, community pressures, green procurement, ecolabeling, etc. Both developed and developing country experience is reviewed, although nationally the former is better documented, partly because of the longer record of use of these instruments. The focus is on innovative instruments and their effect on consumption and production patterns. Given the weak enforcement of formal regulations in developing countries, particular emphasis is placed on suasive instruments, community and market pressures, the role of civil society, voluntary agreements, and market leveraging through green procurement by the public sector. The Annex Table 1 lists an additional 31 innovative market instruments. Annex Table 2 presents

a matrix of economic instruments (both conventional and innovative) by type and sectoral use. Annex Table 3 presents the same matrix with entries of selected countries in which these instruments have or are being used or actively explored.

We begin with the removal of distortionary subsidies, which is an essential first step to full-cost pricing and the introduction (and effectiveness) of market-based instruments. We then move to conventional tax and charge instruments and conclude with new and innovative instruments.

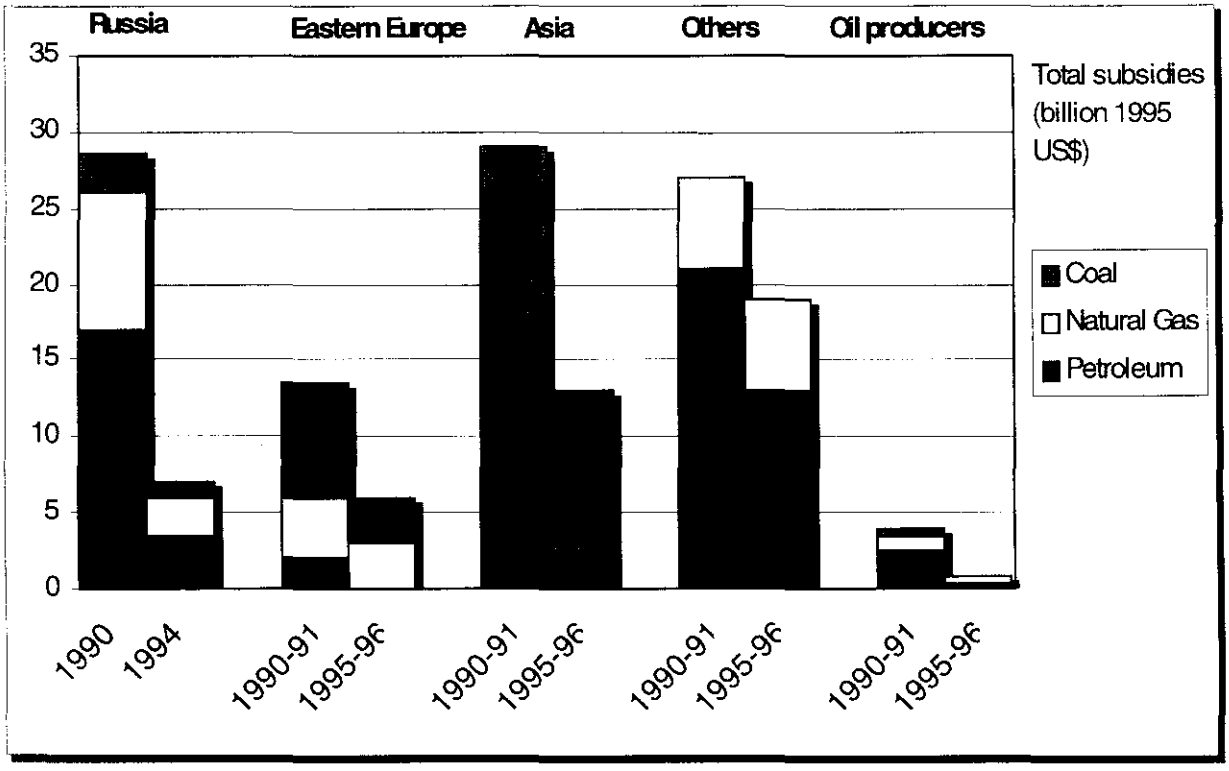
Subsidy Removal

Environmentally damaging and economically distortionary subsidies are estimated to range between $0.5 and $1.00 trillion per year, roughly divided equally between developed and developing countries (Moor 1997; Roodman 1996; Xie 1996). In OECD, agriculture is most heavily subsidized (over $330 billion) followed by road transport ($85-200 billion). In developing countries, energy ($150-200 billion) and water ($42-47 billion) receive the largest subsidies. These subsidies are a large drain on the budget, distort economic decisions, and thereby lower economic efficiency and growth, accelerate the depletion of natural resources, and degrade the environment. They are also distributionally regressive as they benefit mostly the wealthy. To put subsidies in perspective, they exceed the annual public sector budget for investment in developing countries, which is estimated at $300 billion. The removal of subsidies would save budgetary resources and increase public savings while reducing environmental damage, economic distortions, and inequality. Even if no part of the budgetary savings is spent on the environment or other sustainability-enhancing investments, sustainable development would still be advanced by virtue of reduction of environmental damage and the shift of resources from high to low environmental impact activities. Both production and consumption would be modified towards more environmentally sustainable patterns.

In recent years, there has been a trend towards reduction of subsidies, especially in developing countries:

- There has been a major reduction in energy subsidies in developing countries from over $300 billion in the early 1990s to about $150-200 billion today, a 30-50 percent reduction over the past five years. The subsidies of fossil fuels (coal, natural gas, petroleum) fell from about $114 billion in 1990-91 to about $58 billion in 1995-96 (see Figure 1). Most notable is the reduction of coal subsidies in China from $750 million in 1993 down to $250 million in 1995, a 67 percent cut, and the substantial reduction of energy subsidies in Indonesia, Mexico, and Venezuela. It is estimated that removal of energy subsidy in developing countries would yield $35 billion in economic benefits (measured in social welfare terms).

Figure 1 Estimated Changes in Energy Subsidies in Selected Countries, 1990-91 to 1995-96



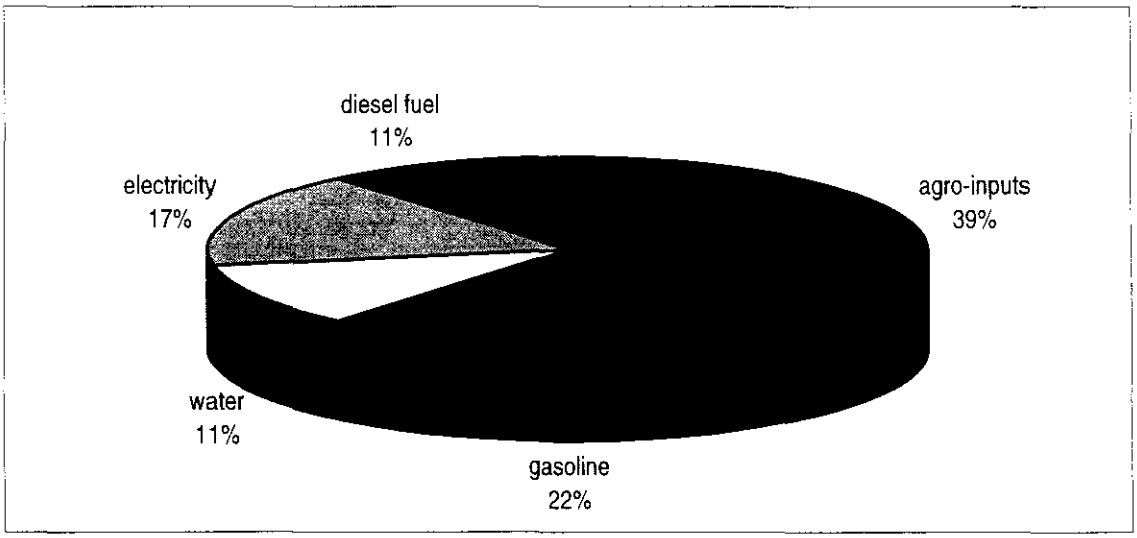
Source: The World Bank (1997) *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*, Rio+5 Edition Draft for Discussion, The World Bank.

- Cost recovery in irrigation has increased from an estimated 10-20 percent in the 1980s (Repetto 1988) to about 20-25 percent today (Moor 1997). Still, $20-25 billion go to irrigation subsidies in developing countries every year and another $20 billion to drinking water supply. Removal of water subsidies would reduce water use by 20-30 percent (in parts of Asia by as much as 50 percent) and make it possible to supply most of the $1.2 billion people without access to safe drinking water without large environmentally destructive water development projects.
- Agricultural subsidies (not including irrigation subsidies) are estimated at $10 billion, which is lower than earlier estimates. There has been a definite downward trend in the subsidization of agrochemicals. For example, annual fertilizer subsidies in India have been reduced from $2,833 million during 1988-90 down to $1,685 in 1994, a 40 percent reduction since 1990 (FADINAP Database). In Indonesia fertilizer subsidies were cut from $515 million during 1988-90 to only $96 million in 1994, an 80 percent reduction. Similar trends are observed in Bangladesh (which saved $100 million annually), Pakistan, and the Philippines. Positive developments also occurred with regard to pesticide subsidies, which in developing countries in the late 1980s totaled $2 billion totaling $2 billion (author's estimates). The most notable example being Indonesia which cut its pesticide subsidies from $128 million per year (or 82 percent of the retail price) in the mid-1980s down to zero in the early 1990s (Panayotou 1993).
- While road transport subsidies in developing countries still amount to $15 billion (Moor 1997), there is growing use of user charges such as tolls (China), auctioning of urban street rights (Santiago, Chile), area licensing (Singapore), and gasoline taxes (Mexico City), that are beginning to reduce congestion and improved cost recovery. The increased involvement of the private sector in financing, building, and operating public transport systems during the 1990s is creating pressures to reduce road

subsidies and increase user fees. Argentina for example cut subsidies to suburban rail system by $25 million between 1993 and 1995 when it privatized the operation of urban transport (Rebelo 1996).

- In a recent survey of environmental policy makers in Asia large percentages of respondents reported removals or reductions of environmental damage subsidies in their countries: agrochemicals 39 percent, gasoline 22 percent, electricity 17 percent, diesel 11 percent, and water 11 percent (see Figure 1).
- In a recent survey of environmental policy makers in Asia, 40 percent reported removals or reductions of agrochemical subsidies, 22 percent reported removal of gasoline 17 percent electricity subsidies, and 6 percent removal of diesel subsidies (see Figure 2).

Figure 2 Percentage of Respondents (Among Surveyed Asian Environmental Policy Makers) Reporting Removal or Reduction of Environmentally Damaging Subsidies in the Last Five Years (199196), Developing Asia



Source: Asian Development Bank and Harvard Institute for International Development Survey of Asian Policy Makers on Environmental Issues for the Emerging Asia Study, November 1996. The survey was conducted by the Asian Development Bank by mail through official channels and the data were analyzed by T. Panayotou of the Harvard Institute for International Development.

The prospects for further reduction of subsidies are favorable because of accumulated success cases and because of increasing realization of their large costs and dubious benefits. Progress, however, will continue to be slow because of opposition by vested interests. Increasing public awareness and transparency are key to more speedy removal of environmentally detrimental subsidies. International cooperation and concerted action may help alleviate concerns regarding the rational, though largely unfounded, concern about the potential short-term impact of subsidy removal on international competitiveness.

Environmental Taxes and Charges

Environmental taxes are particularly effective instruments for internalizing environmental externality costs directly into the prices of products and services that generate them. They provide incentives for both consumers and producers to change their behavior towards a more efficient and sustainable use of resources. They also raise revenues that can be used either for environmental expenditures or to reduce taxes on labor, capital and savings. Environmental taxes have been used most extensively in Western Europe, where they began in the 1960s and 1970s as cost-recovering charges and evolved into incentive and fiscal environmental taxes in the 1980s and 1990s. Today environmental taxes are used as instruments for green tax reforms and partial replacement of distortionary taxes (on labor, capital, saving) by corrective taxes (on energy, pollution, chemicals). Energy taxes account for 5.2 percent of total EU taxes and for as much as 10 percent in Portugal and Greece. Non-energy environmental taxes represented only 1.5 percent of total EU taxes in 1993 but account for over 4 percent in Denmark and over 5 percent in the Netherlands. The most effective environmental taxes are considered to be the Swedish air pollution tax, and the Dutch water pollution tax. Table 2 below reports on results of an evaluation of their environmental effectiveness and incentive effects of various environmental taxes throughout Europe. Concerns about their effects on competitiveness and their regressivity constrains the more extensive use of environmental taxes to alter consumption and production patterns to the desired levels. Prior removal of perverse subsidies, revenue-neutrality, or recycling of revenues in green tax reform and prior consultation and gradual implementation can make environmental taxes more acceptable and implementable.

Table 2: Evaluated taxes, their functions and effectiveness

Instrument	Environmental function	Environmental effects	Incentive effects[1]
Fiscal environmental taxes			
Sulfur tax (S)	To increase penetration of low-S fuels and adoption of S-abatement measures	Reduction of 6,000 tons of S corresponding to 6% reduction of total S emissions[2]; reduction of S content of oil by 40% on average; ¼ of tax payers reduced S emissions by 70% on average	Average abatement costs were about SEK 10, lower than the tax rate of SEK 40 therefore strong incentive effect
CO_2 tax (S)	To reduce CO_2 emissions	Hard to evaluate due to short period of operation; possible shift in fuels and increased competitiveness of combined heat and power plant	Unknown
CO_2 tax (S)	To reduce CO_2 emissions	CO_2 emissions dropped by 3-4% in 1991-1993 from a rising trend	Price of heating oil increased 15% and price of petrol increased 10%; otherwise unknown
Tax on domestic flights (S)	To reduce emissions by nationally operated air transport	Unknown, but most likely very small	Unknown
Waste charge (DK)	To reduce waste generation and increase recycling and reuse	Reused fraction of demolition wasted increased from 12% to 82%; contributed to an increase in reuse and recycling rate of 20-30% between 1985-93.	Tax rate doubles average cost of waste dumping and increases cost of incineration by 70% on average; otherwise unknown
Incentive charges			
Tax differentiation on leaded petrol (S)	To increase penetration of unleaded petrol	Emissions of lead dropped by about 80% between 1988-1993	Tax differential exceeds additional production costs of unleaded petrol
Tax differentiation for diesel (S)	To increase penetration of low-pollution diesel fuels	75% reduction of S emissions by diesel cars; 95% in cities; reduced emissions of particles, smoke, No_x, Hydrocarbons and PAC expected but not quantified.	Tax differential higher than additional production of costs of classes I and II.
Toxic waste charge (D)	To reduce the amount of toxic waste	Reduction of toxic waste production of 20-45% between 1991-93.	Tax rate increased average dumping and incineration costs by at least 5-15%; rate doubled in 1993 increasing this cost to 10-30%; otherwise unknown.
No_x charge (S)	To speed up reduction of No_x emissions from large combustion plants	Main cause of the reduction by 9,000 tons in 1992 (35% of liable emissions)	Charge rate of SEK 40 exceeds average abatement costs of SEK 10
Fertilizer charge (S)	To reduce the demand for fertilizer	N down by 25%; P down by 65% between 1980 and 1992; charge was one of the factors	Unknown
Water pollution charge (F)	To simulate adoption of in-plant wastewater treatment measures and building of treatment plants	Modest	Charge rate considerably lower than average pollution abatement costs
Water pollution charge (D)	To support adoption of water pollution abatement in permit application process	Early announcement contributed to stepping up construction of wastewater treatment capacity	Original relation between charge rate and marginal abatement damage costs were not implemented
Cost-covering charges: user charges			
Water pollution charge (NL; non-State)	To finance wastewater treatment plants	Water pollution (BOD) down to 5% of households and to 4 million i.e. from industry	Average charge slightly lower than average pollution abatement costs
Household waste charge (NL)	To promote a fair distribution of waste management costs over users	10-20% less household waste supply in 'pay-per-bag' villages	Unknown
Cost-covering charges: earmarked charges			
Battery charges (S)	To cover costs of collection and disposal and of information	Collection of lead-batteries 95%; decreasing share of small Hg and NiCd batteries	Charge renders recycling of PB-batteries feasible
Aircraft noise charge (NL)	To finance insulation and redevelopment programs around airports	Insulation of buildings around airport areas	Very low

[1]Incentives for producers and consumers
[2]Not all sulphur emissions are taxed in this way. The percentage reduction of the lower, taxed emissions of sulphur is much higher, but a figure is not available.

Source: European Environmental Agency (1996)

Pollution charge systems are used extensively in the transition economies of Central and Eastern Europe and Republics of the former Soviet Union. They are often of the "two-step" variety with lower base rates for emissions below firm-level limits and penalty rates that are multiple of the base rates for abuse-limit emissions. These systems tend to be comprehensive, sometimes covering more than 100 pollutants. Table 3 presents a summary of these systems, their goals, rates, number of pollutants, and use of the revenues. Most of these systems are used as revenue raisers for capitalizing national environmental funds.

Table 3: General features of charge systems in European transition economies in 1994

Country	Media	System type	Goals	Penalty mulitiple (of base rates)	Revenue distribution	# of pollutants charged	Revenue leaders	Rates vary by region?	Factors determining charge rates	Rates indexed for inflation?
Belarus	Air	TT-U	PPP	15	SF-90%	>150	No data	No	CC, D, PR, R	Yes
	Water	TT-U	PPP	15	NF-10%	>150	No data	No	CC, D, PR, R	Yes
Bulgaria	Air	NC-U	C	n.a.	NF-70%	16	SO_2	No	CC	No
	Water	NC-U	C	n.a.	SF-30%	27	BOD/COD	No	CC	No
Czech Republic	Air	TT-U	R	1.5	NF-100%	90	SO_2	No	CC, D, PR, R	No
	Water	TT-P	PC	5		5	BOD	No	CC, D, PR, R	No
Estonia	Air	TT-P	PPP	5-500	NF-50%	139	SO_2	Yes	CC, R	Yes
	Water	TT-P	C	5-1000	SF-50%	8	BOD	Yes	CC, R	Yes
Hungary	Air	NC-P	C	n.a.	NF-70%	150	SO_2	Yes	CC, D, PR, R	No
	Water	NC-P	C	n.a.	SF-30%	32	No data	Yes	R	No
Kazakhstan	Air	TT-P	PPP	1-10	SF-65%	>100	No data	Yes	CC, PR, R	Yes
	Water	TT-P	PPP	1-10	NB-20% NF-15%	>100	No data	Yes	CC, PR, R	Yes
Latvia	Air	TT-U	C	4	SB-70%	7	SO_2	No	D, PF	No
	Water	TT-U	C	4	NB-30%	10	BOD	No	D, PF	No
Lithuania	Air	TT-P	CE	10	SF-70%	All	No data	No	CC, D	Yes
	Water	TT-P	CE	10	NB-30%	All	No data	No	CC, D	Yes
Poland	Air	TT-U	C	10	SF-64%	62	SO_2	No	D, R	Yes
	Water	TT-P	C	about 4	NF-36%	6	BOD/COD	Yes	D, R	Yes
Russia	Air	TT-U	R	5	SF-54%	>100	No data	Yes	CC, PR, R	Yes
	Water	TT-U	R	5	NF-36% NB-10%	>100	No data	Yes	CC, PR, R	No
Slovakia	Air	TT-P	C	1.5	NF-100%	123	Particles	No	CC, PR, R	No
	Water	TT-P	C, R	3		5	BOD	No	CC, PR, R	No

System Type:
- TT-U Uniform two-tiered structure
- TT-P Progressive two-tiered structure
- NC-U Uniform non-compliance penalty system
- NC-P Progressive non-compliance penalty system

Goals:
- C Encourage compliance
- CE Cost-effectiveness
- PPP Polluter pays principle
- R Revenue raising

Revenue Distribution:
- NB National Budget
- NF National environmental fund
- SB Sub-national (regional or municipal) budget
- SF Sub national (regional or municipal) environmental fund

Charge Rate Determinants:
- CC Compliance costs
- D Damage to environment
- PF Political factors
- PR Enterprise profitability
- R Government revenue needs

Source: Vincent and Farrow (1997)

The oldest and best known use of pollution charges in a developing country was the Malaysian effluent charge system. As far back as 20 years ago, the Malaysian Environmental Quality Act of 1974 included provisions for using economic incentives and disincentives in the form of effluent charges in support, rather than replacement, of regulatory controls on discharges. The act requires that all dischargers pay a fee to obtain a license to discharge waste into public water bodies. The first discharge fees were collected in 1978. With the standards becoming more stringent over time and the discharge fees becoming larger with the quantity of waste discharged, the results were dramatic. Despite a 50 percent increase in the number of palm oil mills between 1978 and 1982 and a steady increase in palm oil production, the total biochemical oxygen demand (BOD) load released in public water bodies dropped steadily from 222 tons per day in 1978 to 58 tons in 1980, 19 tons in 1982, and 5 tons in 1984 (Ong et al., 1987, quoted in Knesch, 1991).

The Malaysian combination of economic charges and standards worked as follows. In the first year (1978) of implementation of the system, the standard was set at 5000 mg/l of BOD and was not mandatory, in recognition of the initial difficulties that would be faced by the industry. The effluent related license fee was set at US $3 per ton of BOD discharged up to the standard. In the following year, the BOD standard was made stricter (2000 mg/l) and mandatory and progressive effluent charges were imposed to provide an incentive for the establishment of waste treatment facilities. If the BOD concentration exceeded the prescribed standard, a surcharge was imposed equal to $100 per ton above the standard. This is equivalent to a non-compliance fine or a compliance incentive. The rates were set such that the annual fees for untreated discharge exceeded at least the capital costs for building treatment facilities based on cost estimates for the anaerobic lagoon treatment facility. This already departs from the theoretically correct effluent charge, which should equal the marginal environmental damage, not the costs of installing a discharge treatment facility. Nevertheless, the system performed fairly well in managing pollution problems in the palm oil industry as long as the charges maintained their real value and were fully collected. By 1984, when the effluent standard was tightened to 100 mg/l, the BOD load discharge by the palm oil industry was down

to only 4 tons per day out of 1640 tons of BOD generated per day. A similar system was adopted for the control of pollution by the rubber industry, apparently with equal success. By 1984, most rubber factories were discharging BOD under 100 mg/l and the total BOD load discharged was down to 5 tons per day out of a total load of 200 tons generated per day.

This was a pioneer system for a developing country, and despite its inefficiencies, it did not result in loss of competitiveness for the Malay palm oil industry. According to Khalid (1991), Malaysia's palm oil export sector "lost only 5 percent of the value of output as a result of environmental regulations from 1982-1986 that reduced allowable BOD discharges by 90 percent. The CPO [crude palm oil] sector lost even less — only about 1 percent of the value of production . . . despite the highly competitive nature of world oil markets (cited in Vincent, 1993; p.24)." In contrast, Khalid (1991) found large losses among the primary input producers, the oil palm plantation sector, which bears over two-thirds of the total welfare losses of the industry.

There is no disputing the environmental success of the system. "In 1975, the BOD load discharged by CPO mills was equivalent to the BOD load in the raw sewage of 12 million people . . . By 1985, however, the population-equivalent BOD load fell to only 80 thousand people." (Vincent & Rozali, 1997, p. 320) This decrease is even more remarkable when once considers that at the same time, "CPO mills more than doubled and the industry's output of crude palm oil more than tripled." (Vincent and Rozali, 1997.)

Community and Civil Society Pressures

There is growing evidence from both the North and the South indicating that neighboring communities influence the industry's environmental performance (Pargal and Wheeler, 1996; Huq and Wheeler, 1993; and Hettige and Wheeler, 1996). Communities have a variety of ways to enforce compliance either to existing regulations or to community norms and informal regulations using both the political process and the civil society (community groups, NGOs, local religious institutions, citizens' movements, the media, etc.). Responding to social norms or the threat of social or political sanctions (and in some cases physical action), factories

negotiate directly with local communities to reduce their emissions, or implicitly modify their behavior to conform to community norms and expectations. Studies indicate that a good deal of the variations in environmental performance among firms is explained by community pressures. Stronger, wealthier and more educated communities tend to be more vocal and more effective in influencing the environmental performance of firms in their locality.

Thailand is a case in point. Statistical analysis of a survey of 500 firms in 10 provinces in the greater Bangkok Region revealed that despite very weak enforcement of formal environmental regulations, as many as 60 percent of the sampled firms have formulated environmental plans or carried out internal environmental audits. When asked to rate the factors that influence their decisions to improve their environmental behavior, firms rated community and neighborhood pressures above potential lawsuits and pressures from industry associations, customers abroad and the news media, and almost at par with government regulations, economic incentives, and pressure from shareholders. Only pressures from customers at home and from employees were ranked as more important than community pressures. Moreover, it was found that pressures from groups outside of management (especially community groups) had a significant effect upon the likelihood of an enforcement action by regulation (Panayotou et al. 1997). Hettige et al. (1996) found similar results with regard to community pressures in countries as diverse as Indonesia and Bangladesh. The level of education and income per capita explained much of the variation among communities in the pressure they exert on the industry in their territory to control its pollution. Informal regulation by communities tends to be stronger when pollution levels are higher and affect more people of higher education and income level. This finding underlines the importance of human development in environmental management. Perhaps, regulators should focus more of their efforts in empowering communities to effectively negotiate with the industry, especially where poverty, low-education level and lack of information and organization translate into weak bargaining power.

Market Pressures: Reputational and Trade Effects

Industry operates in local and international markets for both customers and investors. The decisions of both of these groups are increasingly affected by environmental considerations. Consumers, especially in middle and upper classes, are making environmentally informed choices, especially as environmental awareness increases and certification and ecolabeling schemes (see below) proliferate. Studies show that consumers in Europe are willing to pay price premia of 5 - 10 percent of the price for products that are more environmentally sound (in production, operation or disposal). Investors, on the other hand, have to consider the risk of financial losses from liability suits and regulatory sanctions. With trade liberalization, the globalization of financial markets and the information revolution, reputational effects acquire particular significance. Evidence from Eastern Europe indicates that industrial firms which export to the European Union tend to be more concerned with environmental performance to have actually cleaner production processes than firms that produce for the domestic market or for exports to the former Soviet Union markets, which are less environmentally conscious, partly because of lower income levels.

The effect of market pressures and reputational effects on environmental performance varies significantly across firms depending on size, ownership, export orientation, and location among others. The key is whether their profitability can be affected by judgements of environmental performance by customers, suppliers, and investors as recent OECD studies have indicated (Arone and Cahan 1994 and Hamilton 1995). Similar results are obtained in developing countries (e.g. Thailand and Indonesia) where larger, export-oriented firms are found to be more environmentally responsive (see Panayotou et al. 1997 and Hettige et al. 1995).

The policy implication of these findings is how to better shape and channel market pressures to improve the environmental performance of firms. Public disclosure of information pertaining to environmental performance and ecolabeling schemes are two possible approaches.

Informational Regulation

A new approach to self-regulation that gained considerable interest and momentum in recent years is the so-called "informational regulation" which encourages the production of information about pollution generation, both as a source of incentive for behavioral change and as a benchmark for subsequent regulation. The best known example is the US Toxic Release Inventory (TRI) which requires businesses to report the amounts of toxic materials that they put into the environment. While this system has led to reduction in the amount of toxins released, there is a debate as to why this happened. One hypothesis is that TRI gave firms a benchmark to compare their performance to that of other firms. Another hypothesis is that the release of information makes it possible for communities and markets to react to the environmental performance of firms and thereby creates reputational and financial incentives to behave in a socially more responsible manner by controlling waste and investing in pollution abatement (see sections on market and community pressures below).

The best known informational regulation in a developing country is the public disclosure program in Indonesia. In the face of a 10 percent annual growth of manufacturing, a weak enforcement of formal regulation, and mounting pollution damages, Indonesia's National Pollution Control Agency (BAPEDAL) introduced a program for rating and publicly disclosing the environmental performance of factories. The expectation was that pressure from public disclosure will provide low-cost substitutes for formal enforcement of regulations. The Program for Pollution Control, Evaluation and Rating (or PROPER), announced in June 1995, assigned a color rating to each polluter based on BAPEDAL's evaluation of its environmental performance, from black (worst) to gold (best). Factories which meet national environmental standards are assigned a blue rating while factories with pollution control efforts that fall short of the standard are assigned a red rating. Factories with emissions control well above the standard receive a green rating, while outstanding performers receive a gold rating. During the pilot phase, 187 plants were rated but only five green plants were publicly announced. All the plants which were rated red and black, a total of 121, were privately notified and given six months to improve their performance. By the time of full disclosure, December 1995, half the plants rated earlier as

black succeeded in upgrading their status, so did a large proportion of the red-rated plants. The number of plants in full compliance (blue) rose by nearly a fifth from 61 to 72. Most notably, one of the facilities given a green ranking six months earlier was downgraded in response to protests by the community living in the vicinity of the facility. Domestic private firms fared the worst, foreign firms the best and state enterprises in between. The multinationals' strong performance was largely due to scale economies due to their size and only in small part to their export orientation.

While it is too early to evaluate the program, the preliminary results suggest that industrial polluters respond to informational regulation. Why? For two reasons: (a) public disclosure empowers local communities which use the government-certified performance ratings to negotiate pollution control agreements with factories in their vicinity; and (b) public disclosure works through the market as an incentive regulation through reputational effects and by penalizing bad behavior and rewarding performance. At the same time, it improves the regulator's information and enlists the help of superior performers in identifying poor performers. Yet the scheme is not without its critics, who are concerned whether it is extendable from the few large factories to the many small ones; whether the scheme will continue to be effective when its novelty wears off; and, whether its higher effectiveness in better-off, more educated communities will encourage relocation of polluting industries to poorer/weaker communities. An attempt to extend the scheme to the Philippines was less successful largely because of inadequate local commitment and participation.

Ecolabeling

The German Blue Angel scheme, introduced in 1977, was the first national ecolabeling program. Its objective is to guide consumers to purchase products with lower environmental impact and to induce the industry to develop and produce more environmentally friendly products. The Blue Angel is a registered trademark of the Federal Ministry of the Environment and the program is administered by the Federal Environment Agency, the German Institute of Quality Assurance and Labeling, and the Environmental Label Jury. A product's entire life cycle

is examined (including efficient use of raw materials and energy and environmental impacts of operation and disposal). The criteria are reexamined every three years for effectiveness and technological obsolescence. By 1994, 3,500 different products in 75 categories were awarded Blue Angel labels, up from 500 products in 33 categories in 1984 (Yang, 1996).

The Nordic countries (Finland, Iceland, Norway and Sweden) have introduced in 1989 the Nordic Ecolabeling scheme, the first harmonized voluntary multinational ecolabeling program. The objectives of the scheme is to guide the consumers in choosing the least environmentally harmful products, to encourage the development of environmentally friendly products and to tap market forces to reinforce the effect of environmental legislation. The Coordinating Body for Eco-Labeling oversees the Nordic White Swan Environmental Labeling scheme by setting general guidelines. The scheme is operated by the national boards in each member country, which establishes specific criteria and award labels. The criteria are based on life cycle analysis of products, including consumption of natural resources and energy and generation of air and water emissions and solid waste. Internationally standardized test methods are applied and reporting of testing procedures and data is required. The Nordic Ecolabeling scheme parallels the EU Eco-Label scheme.

In 1991, Australia introduced the Environmental Choice Ausatralia EcoLabeling scheme, as an environmental claim verification program to ensure that products and services possess the environmental characteristics claimed by their suppliers and to educate and inform consumers about the true environmental impacts of products and services. The program is operated jointly with Environmental Choice New Zealand by the Australian and New Zealand Environment Conservation Council (ANZECC). The scheme does not select product groups and establish criteria, despite misconceptions to the contrary. The administrators of the scheme performs random tests of environmental claims of particular products. Corporations making false environmental claims are fined up to $100,000 and individuals up to $20,000.

Several developing countries, including China, Korea, Peru, and Cost Rica, are beginning to introduce ecolabeling schemes. Following the Rio Summit, the Chinese government introduced the "Ten Points for Environment and Development," which designates the

development of environmentally friendly products as one of the country's priorities. In 1993, the National Environmental Protection Agency (NEP) announced the establishment of the National Environmental Labeling Program, and in 1994, the establishment of the China Committee for Environmental Labeling to administer the Program, select product categories, set criteria, and approve certifications.

Differential Taxation and Cross-Subsidization of Environmentally-Friendly Products

In an effort to shift electricity consumption away from fossil fuels and towards renewable energy, the British government introduced the Fossil Fuel Levy and the Non-Fossil Fuel Obligation (NFFO). The Fossil Fuel Levy is charged on every electricity bill and the revenues are used to finance the NFFO. Therefore, the levy is a double subsidy for renewable energy. In 1996, the levy raised £94 million or $145 million from fossil fuel users and was channeled to the development of renewable energy. This is the equivalent to an almost $300 million "price wedge" between fossil and non-fossil fuels. Furthermore, as of April 1998, the energy market will open to full competition and energy users will have the opportunity to choose their source of energy; if prices are comparable (and the levy-NFFO system helps renewables to compete), many users are expected to opt for more sustainable energy sources such as wind power and geothermal energy (Sykes 1997). This case demonstrates that with the right instruments in place, deregulation and market liberalization can help promote more sustainable consumption patterns.

A somewhat analogous scheme (though not as directly linked) was used by Germany to reduce vehicle emissions and promote the use of unleaded gasoline and catalytic converters. In 1985, the federal government implemented a tax differential of 0.04 DM per litre (subsequently raised to 0.10 DM per litre) in favor of unleaded gasoline to change consumer behavior. The differential tax was very successful: today, unleaded gasoline accounts for 90 percent of all gasoline purchases in Germany. Differential excise taxes have been used by virtually all western European countries to promote the use of unleaded gasoline. Table 4 suggests a positive relationship between the differential excise and VAT and the market share of unleaded gasoline.

Table 4: Differential excise taxes and market share of unleaded gasoline in selected countries

Country	Differential Excises + VAT ECU / 1000L	Market Share Unleaded Gasoline (estimate)
Denmark	102.66	70%
Norway	95.05	55%
Austria	93.82	65%
Belgium	86.43	70%
Finland	83.18	70%
Luxembourg	82.58	85%
Sweden	74.54	60%
Netherlands	73.75	65%
United Kingdom	71.17	45%
Portugal	70.88	15%
Greece	69.51	15%
France	66.18	35%
Germany	58.50	85%
Switzerland	48.80	65%
Italy	43.92	15%
Ireland	41.70	30%
Spain	41.41	10%
Average in 1992		50%
Average in 1988		28%
Average in 1996		0%

Source: Kogels, Han. "Rate Differentials as Instrument for Environmental Policy" in *Environment Taxes and Charges: Proceedings of a Seminar held in Florence, Italy, 1993 during the 47th Congress of the International Fiscal Association.* Kluwer Law International, 1995. Table 2, Page 67.

At the same time, the government introduced tax differentials for low or reduced emissions vehicles and gave new cars with catalytic converters a tax holiday amounting to DM 3,000 per car (subsequently lowered to DM 1,100). This was done in a revenue-neutral way, in the sense that high taxes on high emission vehicles compensated for low taxes on low emission vehicles and the tax holiday for catalytic converter-equipped cars. The government also offered a car tax rebate as an incentive to equip older cars with catalytic converters making the system a "feebate" scheme with both fee and rebate elements.

A classic "feebate" scheme operates in Sweden in the form of the nitrogen oxide charge and rebate since 1992. Combustion plants producing electricity and heat are charged $4.80 per kilogram of nitrogen oxide emitted and the revenues are rebated to the plants in proportion to their energy production. It is, therefore, not a tax but a revenue-neutral incentive for environmentally friendly behavior. Plants which produce more energy per unit of emissions benefit, while those who are inefficient and highly polluting lose. Thus the polluters underwrite the more efficient and cleaner plants. Power plants range from those making a payment ($1.2 million) to those receiving a net income ($1.7 million). Several elements are attractive about this system: (a) the fact that the charge has only an environmental purpose (it is not a tax) made it more acceptable to the industry; and (b) because plants are given an incentive to reduce pollution rather than being forced to do so by regulation, the most efficient response is chosen by the plants based on their own individual abatement cost circumstances (marginal abatement functions).

Differential taxation of products based on environmental impacts is beginning to be practiced in developing countries. For example, Thailand used a differential tax between leaded and unleaded gasoline in the early 1990s to encourage a shift to unleaded gasoline and reduced health effects of lead emissions, especially in Bangkok. Cross subsidization of environmentally friendly activities from taxes on environmentally harmful ones has been practiced in Indonesia by requiring logging companies to pay a reforestation fee unless they reforest areas they cleared. Unfortunately, the reforestation fee was set at a level much below the cost of reforestation, thereby resulting in too much cutting and too little replanting.

Voluntary Agreements and Self-Commitments

In 1991, the Federal Office of Pollution prevention in Canada implemented a voluntary pledge program called Accelerated Reduction/Elimination of Toxins (ARET). Under the program, 278 private and public firms voluntarily pledged by the year 2000 to reduce their emissions of 30 persistent, bioaccumulative and toxic substances by 90 percent and another 87

substances by 50 percent. By 1995, emissions were reduced by 10,300 tons, including a 50 percent reduction of high priority chemicals.

In a similar effort, the government of India has launched a campaign to encourage the industry (especially small and medium scale firms) to organize itself in Waste Minimization Circles. Each Circle brings together representatives of industries related either by process, product or location, to exchange information on waste reduction approaches and experiences. With leadership from within the group and technical assistance from a resource person from universities or technical institutions, each group meets periodically to discuss action-oriented ways to minimize waste.

Voluntary agreements and self-commitments are a fairly common occurrence in some countries such as Germany and Japan. Since the 1970s, various sectors of the German industry issued more than 70 self-commitments to reduce pollution, including greenhouse gases. For example, in March 1995, fifteen industry associations in Germany voluntarily declared that they were prepared to reduce their CO_2 emissions by up to 20 percent below 1987 levels by the year 2005. A year later, the Federation of German Industry issued an over-arching declaration committing its members to reduce CO_2 emissions by 20 percent compared to 1990 levels. The Government followed with a political declaration committing itself to refrain from additional regulatory measures on global warming prevention to allow the private initiative of the German industry to take effect. The Government even went to the extent of promising either an exemption from any EU-wide carbon tax for those sectors of industry involved in the voluntary commitment, or a full credit for the CO_2 reductions achieved.

A similar approach has been proposed by the US government for the period leading to the year 2008 when Kyoto commitments (if ratified) become binding. Credits, perhaps at an enhanced value, might be given to early voluntary reductions of CO_2 emissions by US industry. Voluntary commitments have already been announced by some industries such as British Petroleum. Indeed, many of the joint implementation projects undertaken by the industry (mostly power utilities) in the US, Canada, Netherlands, and other countries were voluntary activities without an assurance that they would receive full credit.

Voluntary agreements and self-commitment are not without critics. While supporters applaud them as unbureaucratic and flexible market instruments that are largely self-policed, critics see them as capitulation of environmental policy to industry and contrary to competition. In response to these concerns, the European Commission issued guidelines for the application and drafting of self-commitments and other volunteer environmental agreements, emphasizing that the prime responsibility for achieving environmental policy goals remains with the government, even when self-commitments are used as instruments. The government is to decide whether the objective of such agreements is adequate and monitor its attainment (Delbrück 1997).

Green Procurement Policy

Since 1992, the Office of Federal Procurement Policy of the US Office of Management and Budget (OMB) and the Federal Energy Management Program (FEMP) of the US Department of Energy have been co-sponsoring the Federal Procurement Challenge. The Challenge helps federal agencies to comply with the Energy Policy Act of 1992 and Executive Order 12902, which directs all federal agencies to buy products that are among the 25 percent most efficient in terms of energy and water use, or at least 10 percent more efficient than DOE's national efficiency standards. Twenty-two federal agencies accounting for 95 percent of federal purchasing are participating in the Challenge. The FEMP publishes energy efficiency recommendations for meeting the Executive Order and provides technical support for meeting the goals of the Challenge. The direct objectives of the Federal Procurement Challenge are to (a) save taxpayers money; (b) conserve energy, water, and other natural resources; and (c) reduce federal emissions, including greenhouse gases, by the federal government. But more important than the direct benefits of the Challenge are the indirect effects that it leverages: it helps support and expand the market for "best-practice" energy-efficient, resource saving products; it lowers the cost of environmentally friendly products by providing scale economies and a large and reliable market; it provides leadership for state and city governments as well as corporate and

other institutional purchasers to give preference to environmentally sound products and services in their purchases.

Governments in Europe have also recognized their tremendous leverage power in the market through the billions of dollars they spent annually on products and services. Several governments and local authorities have begun to implement "green purchasing" policies as a way of promoting environmentally sound products. In support of the "Buy Green" movement, the European Secretariat of the International Council for Local Environmental Initiatives (ICLEI) has launched the European Environment Procurement Initiative which provides for an environmental procurement campaign, a Municipal Green Purchases Network, ecolabeling and promotion, and a guide to environmentally-conscious procurement.

Annex Table 1: Innovative Economic Instruments

1. **Tradeable Pollution Permits** (USA, Poland, China)
   - SO_2
   - CO_2
   - Lead
   - Effluents
   - Newsprint
2. **General deposit refund system** (Korea, Holland)
3. **Differential land use tax** (Germany)
4. **Watershed charges** (Costa Rica, Indonesia, Brazil
5. **Tradeable water shares** (Australia, New Zealand, India, California)
6. **Tradeable reforestation credits** (Costa Rica)
7. **Deforestation charges** (Brazil, Central African Republic)
8. **Royalties**
   - sand mining
   - hydroelectricity
9. **Differential entrance fees** (Costa Rica, Kenya)
   - marine parks
   - terrestrial parks

   Ecolabeling
10. **Ecotourism fees** (Kenya, Costa Rica, Thailand)
11. **Scientific tourism fees** (Costa Rica, Madagascar, Indonesia)
12. **Bioprospecting fees** (Costa Rica, Madagascar)
13. **Carbon offsets** (Malaysia, Guatemala, Costa Rica, Paraguay . . .)
14. **Tradeable conservation credits** (Costa Rica, Mexico)
15. **Transferable development rights** (Puerto Rica, USA, Cyprus)
16. **Tradeable development quotas** (small islands)
17. **Environmental charge on built-up space**
18. **Impact fees** (USA, Europe)
19. **Betterment charges** (Korea)
20. **Environmental quality improvement charge** (Korea)
21. **Waste delivery incentives** (Thailand)
22. **Presumptive charges and environmental audits and rebates** (Europe)
23. **Tradeable non-compliance permits** (Bangkok)
24. **Electronic tolls** (Colorado, Norway, Hong Kong)
25. **Environmental performance bonds** (Malaysia, Indonesia)
26. **Overcompliance credits/undercompliance penalties** (China, Germany)
27. **"Voluntary" industry compliance** (Japan, Germany, Thailand)
28. **Fiscal compensation for preservation areas** (Brazilian states of Parana, Sao Paolo, and Rio de Janeiro)
29. **Offset systems/no net loss policy/net improvement** (USA, Germany, Spain)
    - wetland
    - tourism
    - industrial development
30. **Individual tradeable (fisheries) quota** (New Zealand, Australia)
31. **Auctioning of city street use rights** (Chile)

Annex Table 2: Economic Instruments by Sector

	Property Rights	Market Creation	Fiscal Instruments	Charge Systems	Financial Instruments	Liability Systems	Bonds & Deposit Refund Systems
Land & Soils	Land titles, Use rights	Tradeable land permits	Property taxes; Land use taxes	Pollution charges	Soil Conservation Incentives (loans, etc.)	Enforcement Incentives	Land reclamation bonds
Water Resources	Water rights	Water shares	Capital gains tax	Water pricing; Water protection charges	Green (blue) funds		Environmental accident bonds
Oceans & Seas	Turfs Licensing	Fishing rights; ITQs	Pollution taxes				Oil-spill bonds
Forests	Communal rights	Concession bidding	Taxes/royalties	User charges Access fees	Reforestation incentives (subsidies)	Natural resource damage liability	Reforestation bonds; Forest management bonds
Minerals	Mining rights	Tradeable resource shares	Taxes/royalties	User charges	Sectoral funds	Liability insurance	Land reclamation bonds
Wildlife	Stewardship			Impact fees Access fees	Location/ relocation incentives	Natural resource damage liability	
Biodiversity	Patents; Prospecting rights	Transferable development rights	Product taxes Input taxes	Charges for scientific tourism	Ecofunds	Natural resource damage liability	
Water Pollution		Tradeable offsets/credit; Tradeable effluent permits	Effluent taxes	Water treatment fees; Pollution charges	Low interest loans	Non-compliance charges	Waste delivery bonds Environmental accident bonds

List is representative, not exhaustive

Annex Table 2 (continued): Economic Instruments by Sector

	Property Rights	Market Creation	Fiscal Instruments	Charge Systems	Financial Instruments	Liability Systems	Bonds & Deposit Refund Systems
Air Pollution		Tradeable emission permits	Emission taxes	Pollution charges; Betterment charges	Technology subsidies; Low interest loans	Non-compliance charges	Environmental accident bonds
Solid Waste			Property taxes	Collection charges, Impact fees		Liability insurance	Deposit-refund systems; Waste delivery bonds
Hazardous Waste (zero assimilative capacity)			Differential taxation; Product taxes	User charges; Collection charges	Waste delivery incentives	Joint & several liability; liability insurance	Bonds; Deposit-refund systems
Toxic Chemicals			Differential taxation; Product taxes	User charges; Impact fees		Legal liability; Natural resource liability; Liability insurance	Deposit-refund systems
Human Settlements -land use -congestion	Land rights Buy-own-transfer (BOT) Arrangements	Tradeable development quotas; Transferable development rights	Property taxes; Land use taxes	Betterment charge; Development charge; Land use charge; Road tolls	Location/ relocation incentives		Development completion bonds
Global Climate		Tradeable CO2 permits; Carbon offsets; Tradeable emission entitlements; Tradeable forest protection obligations	Carbon taxes; BTU tax	Pollution charges	CFC replacement incentives; Forest compacts		

Annex Table 3: Countries Implementing Innovative Economic/Financing Instruments for Sustainable Development

	PROPERTY RIGHTS	MARKET CREATION	FINANCIAL INSTRUMENTS	ENVIRONMENT CHARGES	FINANCIAL INSTRUMENTS	SUBSIDY REDUCTION	BONDS/DEPOSIT REFUND SYSTEMS	RESOURCE PRICING	OFFSET SYSTEMS/JI
BIODIVERSITY	Costa Rica Madagascar	Puerto Rico Costa Rica US (Maine, New Jersey)		Costa Rica Nepal Madagascar		Brazil		Kenya Costa Rica Thailand	Costa Rica Belize
FORESTS	Congo	Costa Rica Côte d'Ivoire	Brazil Central African Republic Columbia Venezuela	Brazil Costa Rica Indonesia	Costa Rica	Brazil Central America	Thailand Philippines Malaysia Panama	Indonesia Malaysia	Costa Rica Guatemala Malaysia
FRAGILE ECOSYSTEMS		Puerto Rico Costa Rica		Indonesia Brazil Costa Rica					
FRESH WATER SOURCES	USA Chile India Hungary	Chile India Australia New Zealand		Malaysia Korea Costa Rica Brazil China Several OECD	Indonesia Thailand	Eastern Europe Morocco China		Brazil Chile	Germany
LAND RESOURCES	Thailand Papua New Guinea	Puerto Rico USA	Germany Japan	Korea Mexico	USA	Brazil France	Malaysia Australia		Korea
SUSTAINABLE AGRICULTURE	Mexico Argentina Sri Lanka					Indonesia Most developed countries		Korea Peru Germany	

Annex Table 3 (continued): Countries Implementing Innovative Economic/Financing Instruments for Sustainable Development

	PROPERTY RIGHTS	MARKET CREATION	FINANCIAL INSTRUMENTS	ENVIRONMENT CHARGES	FINANCIAL INSTRUMENTS	SUBSIDY REDUCTION	BONDS/DEPOSIT REFUND SYSTEMS	RESOURCE PRICING	OFFSET SYSTEMS/JI
ATMOSPHERE	Philippines	Kazakstan USA China Poland Chile Singapore	Switzerland China Most OECD Many developing countries	Sweden USA China France Korea	China Thailand		Sweden		USA Germany Poland Norway Argentina Russia
OCEANS/ FISHERIES	Mauritania Brazil Sri Lanka Bangladesh	New Zealand Australia				Philippines	USA		
HAZARDOUS WASTE/TOXIC CHEMICALS	USA	Korea	Many developing countries	Europe	Thailand	Indonesia		USA	
SOLID WASTE	Bazil		Scandinavia	Most OECD Denmark Netherlands Some USA states			Japan USA Korea Norway Philippines Chile Netherlands		
URBAN ENVIRONMENT		Chile USA Singapore Thailand	Germany [Netherlands (Vehicles) diff. VAT]	USA Europe Korea Singapore	Turkey	Thailand	Korea Netherlands	Singapore USA Vietnam China	Korea

See Appendix Table 1 for details on type of instrument.