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**II MEETING: THE APPLICATION OF ECONOMIC INSTRUMENTS IN  
WATER AND SOLID WASTE MANAGEMENT**

***ECONOMIC INSTRUMENTS FOR WATER MANAGEMENT IN LATIN AMERICA AND  
THE CARIBBEAN***

ISSUE BRIEFING

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## ECONOMIC INSTRUMENTS FOR WATER MANAGEMENT IN LATIN AMERICA AND THE CARIBBEAN

### Summary & Perspective

The central issue of the II Meeting of the Environment Network of the Regional Policy Dialogue, to be held on February 25 and 26, 2003, is "the application of economic instruments in water and solid waste management". This Meeting has, on the water side, been informed by descriptions and analyses of a variety of approaches, including examples from a number of European countries (Kraemer, *et al.*), a longer study of the French water management system (Feres, *et al.*), and two Latin American country case studies, Brazil (Seroa da Motta and Feres) and Mexico (Saade Hazin and Saade Hazin). Each study provides a wealth of detail, set against a background of instrument typologies and commentary on instruments based on the extensive economic literature examining their advantages and disadvantages.

To put this material in perspective, the following observations may be helpful:

?? There is something of a disconnect between the focus of the environmental economics literature on instrument design, and the reality of instrument application reviewed by these studies. The attention given in that literature to the ability, or lack thereof, of an instrument to deliver the least-resource-cost solution to the problem of meeting regional or national ambient environmental quality standards is not reflected in the choice and design of the real instruments. Other parts of the literature hint at why this might be, telling us how difficult it is in practice to design least cost solutions to achieving ambient environmental targets using price or regulatory instruments, and how such solutions would have to change in a world that is not even remotely static. But that literature also tells us there are other important characteristics on which to judge the systems described, when thinking of them as candidates for adoption in other countries represented in this dialog.

?? The actual economic instruments described can be cataloged under 5 headings:

- 1) One set has a general incentive purpose – as in water abstraction charges aimed at encouraging reductions in total volumes extracted and waste disposal charges aimed at encouraging reductions in total discharges. These instruments, if set high enough to have effects on behavior, can in principle deliver specified reductions in aggregate extraction or discharge at lower cost than command and control approaches. (In practice the costs of monitoring and enforcement for various strategies must also be considered.) As the above paragraph notes, these charges have not been designed for least cost achievement of ambient targets.
- 2) A second set is designed to raise revenue, which in turn is used either to subsidize water users or waste dischargers in their pursuit of more efficient water use or to pay for collective facilities with the same goal.
- 3) A third set attempts to have it both ways and get some incentive effect while producing revenue for similar uses to those in (2).
- 4) In several situations, such as the provision of water to households and the sewerage and treatment of domestic wastewater, there are well-defined investment and

operating costs that are supposed to be recovered from the charge levied on the units provided.

- 5) Finally, one example (Mexico's pollution charge scheme) is provided in which the economic incentive is, in effect, a fine for exceeding a discharge standard, going to zero when the standard is met.

In table 1 a summary is provided of the types of instruments described in the dialog studies, using the above categories.

**Table 1**

<b>Cataloging Economic Instruments for Water Management Identified in the Dialog Studies<sup>a</sup></b>				
<b>Country</b>	<b>Water Abstraction</b>	<b>Water Delivery</b>	<b>Sewage Collection &amp; Treatment</b>	<b>Direct Discharge (esp. industry)</b>
Austria			(4)	
Denmark	(1)		(4)	(1)
France		(4)	(4)	(2)
Germany	(3)	(4)	(4)	(1)
Netherlands	(3)			(2)
Brazil	(3)/(4) <sup>b</sup>			(3)
Mexico	(1)			(5)

Notes: The numerals refer to the catalog of types identified in the text:

- (1) Incentive
- (2) Revenue raising
- (3) Attempt to combine (1) and (2)
- (4) Cost recovery as for water works or sewers and sewage treatment plants
- (5) "Fine" for exceeding a standard

a Not every element of the table could be filled in on the basis of the dialog studies. Blanks do not necessarily mean that there is no economic instrument applying to that use in that country.

b The Brazilian case is very complex because of the autonomy enjoyed by the states in designing their own systems.

?? It is worth emphasizing how, by confining the instruments used to these types, the choice of actual per-unit charges is simplified. A generalized incentive can be provided by any charge level high enough to get the attention of the decision makers in firms, municipalities and households. Its effectiveness in changing behavior will depend on its relationship to the marginal costs for different decision makers of changing behavior, which in most cases is either quite well known or discoverable through engineering studies. The same kind of information would be needed if authorities wanted to raise a certain amount of total revenue with the least overall economic burden. But there is not the same need for detailed knowledge of every party's cost structure as there would be if economic efficiency (the full balancing of social marginal costs and benefits of achieving different ambient environmental conditions) were being pursued. In practice a revenue raising charge can be structured simply by estimating revenue needed and parceling that need out over chargeable parties, perhaps evenly, more likely not given political considerations.

?? The approach to economic instruments that stresses revenue collection and use of that revenue for compensatory subsidies or the provision of collective public works may be seen to have a political advantage over the incentive charging schemes. Under the latter,

each party facing the charge must commit resources to making an adjustment to the charge (as by reducing priced waste discharges to the level at which the price equals the marginal cost of further reductions) and must pay the charge on each remaining unit of discharges. By assuming that revenue is recycled through a subsidy or public works scheme with roughly the same environmental goal, the sources will be paying only the resource costs of achieving the goal plus a sort of markup reflecting the administrative costs of the agency through which the revenue flows.

- ?? There is, however, a broader implication for society at large, of emphasizing revenue collection and redistribution (or, for that matter, the charge-equivalent-to-a-fine approach). These choices take away some part of the incentive to innovate that is present in incentive charge schemes. Not all the incentive is lost, for the presence of a standard to be met or even a modest charge to be paid implies that there will be some reward to lowering the costs of responding through innovation. But that incentive will be lower than the one produced by pricing every unit of discharge.
- ?? In the long run, economic instruments aimed at revenue generation may create other problems. A closed system of charges, the revenue from which supports an agency and its planning, construction, operation and subsidization activities, creates an incentive to perpetuate all those activities even if the need for them declines over time (indeed, even if they become socially damaging rather than beneficial).<sup>1</sup>

Table 2 presents a summary of the advantages and disadvantages of the several actual choices of economic instruments relative to each other and to the alternative most often presented in the economic literature. Seven dimensions, found in the literature as bases on which to judge instruments are applied, and brief characterizations of the 5 instruments identified in the dialog studies are provided for each dimension. For contrast, a charge system seeking least-cost attainment of an ambient target is similarly characterized.

A reasonably close look at the table helps one see why generalized incentive and revenue-raising charging schemes are popular with policy designers. They tend to have modest information requirements, and the sacrifice of static efficiency in the pursuit of ambient targets is an ephemeral loss in the ever-changing real world. Otherwise they have somewhat weaker versions of all the virtues ascribed to such a charge system.<sup>2</sup> It is important for real-world decision makers that economists and other policy analysts give proper attention to instrument characteristics that are important in situations where major changes are occurring in the types and quantities of pollution sources, information is scarce, technical progress matters, and compliance with whatever instrument is put in place is hardly something that can be assumed.

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<sup>1</sup> Something very like this has arguably happened to highway construction in the U.S. because of the earmarking of gasoline tax revenues for this purpose.

<sup>2</sup> Note that there is no actual efficiency-seeking charging scheme in existence so far as I know. Several regions have been modeled and charges necessary to attain static efficiency derived from the optimization process, so we know it can be done, but it is a daunting task even for highly developed agencies.

**Table 2**

**Brief Summary of Positive and Negative Aspects of Various Economic Instruments with Contrast to an Efficiency-Seeking charging Scheme**

**Instruments**

<b><u>Dimensions</u></b>	(1) General Incentive	(2) Revenue Production	(3) (1) & (2) Combined	(4) Cost Recovery	(5) “Fine” exceeding standard	(6) for Ambient-based charge system
1. Achieving Static Cost-effectiveness in Ambient Environmental Performance	Only by luck (though policy can achieve total reduction in extraction or loading at lower cost)	Not applicable	Not applicable	Not applicable <sup>a</sup>	Not applicable	The goal
2. Information Needs	Modest and general about charged parties' costs	Cost of plans and subsidies	Combination depending on mix of goals	Well known costs of facilities/operations <sup>a</sup>	Something about cost of meeting standard and probability of discovery	Detailed and specific knowledge of marginal cost functions and regional environmental conditions.
3. Flexibility in Face of Change	Since goal is general, this is not meaningful	Charges adjustable easily and annually.	Again, depends on mix of goals.	Not applicable	Not applicable, except as inflation erodes incentive	Has to be updated as set of sources changes etc. Recalculation is required.
4. Revenue Production	Secondary consideration	The whole point	Part of the point	The whole point	Not important	Secondary consideration
5. Incentives for Technical Change	Greater than an equivalent standard would be	Some but less than incentive charge	Some	Some	Some, but due to standard itself	Conceptually equivalent to Column (1)
6. Monitorability	For all alternatives it is necessary to be able to measure actual discharges per unit time with enough frequency and precision that payment of proper charge or meeting of standard can be assured.					

7. Political Feasibility	Charge payment without obvious return makes it unpopular with sources	Likely easiest political sale	Easier than (1); harder than (2)	Familiar and easy to see what the payment is for <sup>a</sup> .	Easier than (1), since charge can be avoided by meeting standard.	Similar to Column (1)

Notes: <sup>a</sup> It is possible, though difficult, to implement long-run marginal cost pricing which has some efficiency properties but also much greater information requirements than rough average cost pricing. LRMC pricing may also lead to fluctuating charges and either too much or too little revenue.