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**Choosing Environmental Policy Instruments in the Real  
World**

**by**

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## FOREWORD

This paper was prepared by Ruth Greenspan Bell (Resources for the Future – RFF) for the OECD Global Forum on Sustainable Development: Emissions Trading and Concerted Action on Tradeable Emissions Permits (CATEP) Country Forum, held at the OECD Headquarters in Paris on 17-18 March 2003. The aim of the Forum was to bring representatives from OECD and non-OECD country governments together with representatives from the research community, to identify and discuss key policy issues relating to greenhouse gas emissions trading and other project based mechanisms for GHG emission reduction, such as Joint Implementation and the Clean Development Mechanism. The Forum also aimed to promote dialogue between the various stakeholder groups, and discuss policy needs in the design and implementation of tradeable emissions schemes. Forum participants included representatives from OECD and non-OECD governments, as well as from the research community. Those from industry and other institutions involved with emissions trading, joint implementation and clean development mechanism projects such as the European Commission and the World Bank were also represented.

The OECD Global Forums are one of the two pillars of the new architecture of the Centre for Co-operation with Non-Members, agreed upon by the Committee on Co-operation with Non-Members. The Global Forum on Sustainable Development (GFSD) provides a mechanism for achieving the OECD Ministers' outreach objective and will complement other work on sustainable development. Within the organisational framework of OECD, the GFSD will aim to facilitate a constructive dialogue between non-member and OECD economies on key issues on the sustainable development agenda.

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The ideas expressed in the paper are those of the author and do not necessarily represent the views of the OECD or its Member Countries nor of RFF or any other member of the RFF Taiyuan team.

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## EXECUTIVE SUMMARY

In their enthusiasm for efficiency over other values, the advocates for market-based instruments for environmental control have reversed the order in which environmental solutions are found. They have written their prescriptions without first doing a physical examination of the patient; in other words, they have first recommended environmental instruments and secondarily tried to bend institutions to support the already identified cure. The engine for environmental regulation consists of the institutions available country by country to carry out environmental policy. Institutional inadequacies such as low functioning legal systems, historical experience (or inexperience) with markets, distorting and often institutionalised corruption, and public acceptance certainly can be fixed. But changing these fundamentals can be a long and arduous process. Those who advise governments to adopt reforms for which the institutional basis does not yet exist put the cart before the horse, a costly mistake that directs weak countries in the direction of solutions they have little hope of implementing. Instead, the donors and advisors should be seeking alternative approaches, for example to encourage incremental improvements and pragmatic goals, by considering a transitional or tiered approach that will take into account existing capabilities and institutions, at the same time acknowledging that a long learning curve lies ahead with inevitably uneven implementation and slippage from time to time. Another approach would be to find examples of small, albeit imperfect, efforts that seem to be working and building on them. The long-term goal should be efficient solutions, but only the most developed countries should be encouraged to attempt difficult environmental policy instruments like taxation and emissions trading schemes.

## 1. INTRODUCTION

The predominant environmental policy advice that OECD and donors like the international financial institutions have provided through environmental development assistance and advice to the developing world and transitioning countries has a familiar ring. Its themes— principally market solutions—parallel what the institutions and their advisors (advice tagged the Washington Consensus) tell the same countries to do to reform their economies generally.

Clifford Russell, formerly of Vanderbilt University<sup>1</sup> and I have argued that there is a parallel “Environmental Consensus”, that tips heavily in the direction of saying that the best hope countries have to clean up some very badly polluted environments is by adopting management systems based on economic incentives. And, perhaps because many of the advisors are academics on the cutting edge of research, rather than practitioners (there are exceptions), the advice is to try to adopt some of the most difficult of the market-based instruments, namely tradable emissions permits and various taxing schemes. Our concern is that the message about what kinds of institutions, practices, habits and legal and economic culture are necessary to support these very sophisticated instruments is buried in the footnotes or as an afterthought. This reverses the appropriate order of inquiry.

We have expressed concern that the Environmental Consensus deserves a much wider debate. The Washington Consensus<sup>2</sup> is now a very prominent subject; even among economists, there are a wide range of opinions from Stiglitz to Sachs, and the dialogue has opened up to include, as it should, lawyers, sociologists, anthropologists and politicians.

To date, the Environmental Consensus has been a tightly held monopoly of the economists, who dominate both the OECD and the international financial institutions. The difficulty is that economists are only one part of a much larger conversation in the domestic environmental dialogue in the mature environmental regimes, and for good reason. The choice of environmental policy instruments should value efficiency as much as possible, but the policy choices must also be politically acceptable to a wide range of stakeholders, and must be supportable by existing institutions, notably the legal system, the human capital and infrastructure, and by the dominant culture, traditions and habits of each country. Choices about the tools and goals must reflect domestic resolve, will and readiness to perform, since environmental protection requires so much of so many actors in society.<sup>3</sup> It is therefore understandably rare in any of the developed economies that any one group of experts or stakeholders would have such a predominant role as do the economists in policy setting in the developing world.

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<sup>1</sup> See Bibliography for joint writings on this subject.

<sup>2</sup> The Washington Consensus is the name commonly attached to the advice that the international financial institutions’ (IFI) tell the developing world and transitioning countries to do to reform their economies— principally market solutions. The phrase was coined by John Williamson, currently Senior Fellow at the Institute for International Economics in Washington, D.C.

<sup>3</sup> One obvious example is the effort to control non-point pollution. The very nature of non-point is that it is generated, and therefore controlled at uncountable locations, and requires wide-spread cooperation and willingness to act.

As a consequence, the countries most in trouble are not getting a well-rounded picture about what is achievable. What the Consensus does not say is that the institutions, infrastructure, and human capital needed to support the sophisticated environmental instruments the West promotes are not present in much of the developing world. The other missing truth is that the experience with the most highly sophisticated instruments is not very large or deep even in the mature environmental regimes – indeed, some instruments popular with advisors are still more theoretical than applied. This presents little reason to hope that they will be easy to apply in the more difficult contexts of the developing world and countries in transition.

This is a difficult message to deliver to proud countries that, despite having excellent minds in their universities fully capable of running sophisticated models and writing laws, have extremely weak histories of environmental regulation and compliance. Moreover, as many at the International Financial Institutions (IFIs) acknowledge privately, advisors are under pressure to provide “solutions,” when most realistic observers recognise that there is no silver bullet or single solution, for the magnitude and depth of problem that exists.

This paper sets out a brief history of the development of market-based instruments and their dissemination. It then discusses some of the practical and institutional reasons why they are very difficult to genuinely apply – as opposed to plan – in the countries in economic and political transition. The next section discusses my view of the experiment in Taiyuan, China, sponsored by the Asian Development Bank, to promote SO<sub>2</sub> emissions trading. Finally, I make some recommendations about how actual improvements in air and water might be achieved in the future.

## 2. WESTERN INSTRUMENTS

Incentive-based approaches to environmental control were being developed in academia at the same time that many of the basic environmental laws were being written in the United States. As Mikael Skou Andersen (2001) has pointed out, the academic thinkers plainly stated that their aim was to change policy, not just to pursue economic research. However, none of those early laws used economic tools. Although professionals at the US Environmental Protection Agency (EPA) were aware of this thinking, they did not begin to incorporate it into regulatory programs until they were confronted with some very knotty Clean Air Act implementation problems. In response, the EPA set up a system that gave industry the opportunity to bank or sell emission reduction credits in the context of air regulation.

The success of this early experiment led to the enactment in the 1990 Clean Air Act of the now well-known SO<sub>2</sub> -reduction credit banking and trading program as a way to attack acid rain. Firms that can control their pollution more cheaply may accumulate credits and can then sell the credits to others, who must otherwise spend more to reduce pollution.

It is important to remember that these were controversial provisions. They were enacted as a small part of a larger legislative package, but not before considerable scrutiny, as part of Congressional proposals that were considered throughout the 1980s. The design of the SO<sub>2</sub> trading program had to satisfy a wide range of stakeholders. Significant interest groups opposed emissions trading, and partly because of that, the program that was enacted contained a number of important conditions and safeguards. The entire system was developed in the context of a mature “rule of law” society, which means that non-compliance is vigilantly punished through the enforcement system, and there is room for private litigants to enforce against cheating. The government firmly manages system integrity, requires expensive monitoring

equipment to assure that genuine reductions are being sold, and assigns every credit (called an “allowance”) a serial number, to ensure that a unit’s emissions did not exceed the number of allowances it held over a year. All transactions are online and completely transparent.

Trading has clearly helped meet the goal of reducing sulphur dioxide discharges in the United States and has apparently saved society money in the bargain, although unrelated developments like railroad rate deregulation and increased competition in the western low-sulphur coal fields also contributed to this end.

Despite this success, trading is not the dominant U.S. approach to environmental protection, even in a fully developed market system. Most regulatory programs use traditional methods, because to do otherwise poses significant technical challenges and generates political firefights. In fact, there is very little consistency among the approaches embedded in the various U.S. environmental statutes and the tools they impose. Some require cost/benefit balancing; others forbid it. Some are health-based; others are technology based. This is not presented as a virtue; it’s just a fact that reflects the considerable political and bureaucratic interests involved in writing and passing legislation.<sup>4</sup>

And incentive approaches are not universally embraced. Some public advocates oppose economic instruments because they fear that emissions trading cannot be adequately enforced; others mistakenly think these programs sanction pollution. Sometimes industry is resistant. Keohane offers one explanation:

*Firms may simply support the continuation of the status quo...because replacing familiar policies with new instruments can mean the existing expertise within firms becomes less value (Keohane, et al 1997).*

In other words, firms have a number of potentially conflicting objectives and are not only driven by efficiency.

To date, the functioning emissions trading programs in the United States are for air, not water, although the Bush Administration has recently announced a program for water quality trading. Some analysts, my colleague James Boyd among them, have expressed doubts whether the challenges of water basin-based effluent trading – among them highly disparate sources (including non-point), hydrology and the difficulties of monitoring -- can be overcome (Boyd, 2000).

A vivid example of the importance of vigilant enforcement in the success of emissions trading was provided by the breakdown of at least one other U.S. air trading program. Christine Todd Whitman’s New Jersey state trading system for trading nitrogen oxides and volatile organic compounds was recently shut down when enforcers discovered that the biggest single seller of allowances was in violation of its regulatory obligations. Presumably, it was selling suspect credits. The collapse of this seller left little to trade in New Jersey. The much-acclaimed RECLAIM program in the L.A. basin has encountered its own share of problems, concerns about whether it is really reducing pollution, and currently, many doubters.<sup>5</sup>

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<sup>4</sup> Several articles by Daniel H. Cole & Peter Z. Grossman (1999), (2002) explore whether so-called command and control is in fact inefficient, and examine in detail the slow evolution of U.S. practice and law.

<sup>5</sup> See, e.g., the concerns expressed by William D. Nordhaus of Yale University (Nordhaus, 2002), with respect to CO<sub>2</sub> emission trading: “A final concern arises in the wake of the recent revelations of financial finagling in the world’s largest and, it used to be said, most transparent market economy. A cap-and-trade system relies upon accurate measurement of emissions by all relevant parties. If firm A... sells emissions permits to firm B... where both A and B are operating under emissions caps, then it is essential to monitor the emissions of A and B to make sure that their emissions are in fact within their specified limits. ... It was generally supposed that monitoring would be relatively straightforward in countries with strong legal and enforcement systems such as the United States. This was probably naïve and overly optimistic. The

Cole and Grossman nicely summed up the actual complexity of the choices for and against market-based environmental instruments, in their examination of the U.S. system:

*...[S]tandard economic accounts of the comparative efficiency of alternative regulatory schemes are insensitive to historical, institutional and technological contexts. Most importantly, they tend to assume 'perfect (and, incidentally, costless) monitoring,' or they assume that monitoring costs are the same regardless of the control regime that is chosen. ... [T]here are many other economic, institutional and technological variables that can affect the comparison of regulatory options, which is precisely why case-by-case examinations are required."* (Cole and Grossman, 1999 - citations omitted)

Emissions trading is obviously not the only market-based instrument for environmental control. Other economic instruments include deposit-refund systems, which pay people for dropping recyclable material at a centre, and taxes on fertiliser, gasoline, and other polluting agents, tools used in Europe. Germany, France, and the Netherlands charge industry for certain kinds of emissions, but the charges are designed to raise revenue for infrastructure investment rather than to discourage pollution.

Andersen has examined the actual functioning of European systems to use market incentives to control water pollution. He takes the economics profession to task for treating "the issue through micro-economic partial equilibrium analysis that disregards the complexities" (at p. 6) and is concerned that "to apply economic instruments thoughtlessly may quickly discredit this policy instrument" (at p. 23):

*... the choice and implementation of specific policy instruments depends to a considerable degree on the national context .. the national policy style. Strategies for pollution control reflect deeply-rooted traditions of government intervention, and in particular, of the relationship between government and industry. ... Each nation's regulatory style is thus a function of its unique political heritage. It requires comprehensive knowledge of constitutional, administrative, historical and cultural institutions to understand the opportunities and limitations arising from a particular policy style. (Andersen, 2001 - citations omitted)*

Most experts are well aware of the odd fact that many countries formerly under the domination of the Soviet Union also appeared to be using market-like instruments for pollution control early in or even before the transition. They imposed fees and fines on certain emissions and exceedances of regulatory standards, and deposit-refund regimes on bottles and cans. But pollution charges were not an incentive to reduce pollution because they were paid out of the soft budgets of state enterprises; today, they are too small or too inconsistently collected to make a real dent on industry's behavior. In some cases, they have made donor addicts of the environmental agencies that depend on this money for their funding. Deposit-refund systems hit an interesting cultural hot button, as many now perceive them as a grim reminder of a world of poverty in which recycling was a response to deprivation (they may go over better with younger Central Europeans who don't remember the reality of state socialism -compare Drakulic, 1991). These schemes have been the subject of considerable attention from bodies like OECD, who have sought to improve them to fit the new circumstances.

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accounting scandals of the last year have not been limited to dollar scandals, but these have also spilled over into emissions markets. They are not yet emissions scandals because the dollars involved have not cross the nine-digit threshold of perception. ... If emissions finagling takes place in countries with relatively solid legal systems like the United States and the United Kingdom, it would be foolish to overlook the likelihood of emissions cheating in Russia, Ukraine, and many developing countries."

### 3. ECONOMIC SOLUTIONS FOR THE DEVELOPING WORLD AND COUNTRIES IN TRANSITION

The enthusiasms of academic economists from the 1960s and '70s were rekindled in the environment and development community, particularly with the fall of the Soviet Union and the high optimism that market economies would spring up in place of socialism. The countries in transition, with their impressive histories of environmental activism, seemed the right place for their message. These countries were more like industrialised economies than developing countries. They had technically trained civil services, high rates of literacy, excellent universities, and existing, frequently forward-looking, environmental laws. And, the countries (and certainly the local environmental experts) were in a strong reactive mode against anything that smacked of central planning.

There was also high optimism that the countries in transition could leapfrog the “mistakes” made in the name of environmental protection in the West. Much of the advice either came from or was sponsored by the development banks, who occupy the role of the proverbial 800-pound gorilla in the policy deliberations of the developing world. The environmental departments of the international financial institutions tend to be staffed by Western-trained analysts, proficient in efficient markets, but I think it is fair to question whether their understanding of institutional issues is as complete. Their in-country partners are also often well-grounded in the academic literature of environmental economics, rather than the experience of practitioners.<sup>6</sup>

They (and sometimes their advisors) may not have fully understood how mixed was the use of environmental tools in the West.<sup>7</sup> Using phrases like “command and control” called to mind an excessive role for governments in private markets (implying the equivalent of the soviet system dictating every detail from production goals to dates for harvesting crops); in fact, this had little to do with what was really going on in environmental protection in the west, where most often, traditional (a better tag for the category of command and control instruments) and market-based instruments are used jointly in pursuit of a common goal of environmental protection.

Another problem in applying market instruments post-1989 was that it was not as easy to find partners in industry, as it was to find theoreticians. The people who ran state enterprises gained their experience operating in an economy structured under the rules of state socialism. Before 1989, they knew nothing about Western accounting principles and had never encountered shareholders or a stock market. Profit and loss were unimportant. The residue of a trading mentality that had survived in some of the Western-most countries usually manifested itself in small businesses, rarely in large enterprises.

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<sup>6</sup> There was a strong parallel in the environmental law assistance and state-to-state cooperation that took place during the same period. The Russian environmental law drafters at the time, for example, were principally academics not practitioners, whose knowledge of the laws of the west was encyclopedic but who had no experience in applied environmental regulation.

<sup>7</sup> Andersen (2001) finds fault with a theory that inaccurately “treats economic instruments not as a complement to other regulations, but as a perfect substitution to all other regulation.” (at p. 6, footnote omitted).

#### 4. LESSONS FROM THE COUNTRIES IN TRANSITION

There was much effort through the 1990s in places like Kazakhstan, Poland, the Czech Republic, the Slovak Republic and other transitional countries to jump directly to market-based instruments, especially emissions trading. These are often held up as examples of the success of market-based instruments (MBIs). In fact, these were largely planning efforts, or confined to models, demonstrations or pilots. The Slovak Republic wrote a law, but it is not clear whether that law will meet the same fate as many of the environmental laws written in the 1990s throughout the countries in transition, that sit on the books unimplemented. In fact, none of these plans or pilots have gone beyond the experimental, because the prescriptions simply did not fit the conditions for which they were suggested. The intuition that these countries were stronger candidates than developing countries overlooked the fact that they lacked the important institutions and skills that serve as cornerstones of sophisticated market-based instruments for environmental control.

Perhaps the most important of these was motivation. Although it does not seem to have been articulated in the literature, there must have been two assumptions among the advisors: one, that enterprises were motivated to be efficient; and two, because of that, that firms would be natural allies in support of the most efficient environmental tools. But industry in the U.S. did not become advocates for emissions trading on the basis of theory; if that had been the case, perhaps the laws would have included this tool at an earlier stage. They (or some) did so after they had been forced to grapple with actual environmental regulation and genuine enforcement (even now, some resist). Then, the price tag for meeting environmental requirements was made clear in a way that theory can never teach. Economic pain is a great motivator. Importantly, industry in the western economies was able to understand and analyse its economic pain because it was the beneficiary of a century of experience with cost accounting.

Industry in the period when the Soviet Union was dominant had rarely been forced to be in compliance. The laws in Soviet times were called “aspirational”—idealistic ambitions, not guides to day-to-day behavior. Production goals almost always trumped environmental requirements. Regulatory bodies continue to be weak in many of the successor countries, and it is a society-wide challenge to make laws work. The constituency for market-based instruments, in truth, is largely in the academic community. Why should firms try to save money on regulation if they are not yet forced to spend it and do not expect to be in the foreseeable future? The basic issue of motivation was never confronted.

But even had there been genuine motivation, there are still other important issues to take into account. A key consideration is whether institutions exist to manage failure. People who trade emissions exchange an exceedingly complex and intangible property right. They are selling rights to air, and not only that, often rights that extend into the future.<sup>8</sup> These are extremely sophisticated market concepts. Sellers default; buyers go into bankruptcy; participants fall victim to the temptation to false accounting, as did the U.S. firms Enron and WorldCom in a different context. When real money is at stake, some authority, administrative body, or court must be available to police trades and ensure their integrity.

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<sup>8</sup> One interesting test of a country’s capacity for environmental MBIs could be whether it is running successful financial markets; money is a familiar and relatively simple concept, compared with emissions permits.

Donor advice on emissions trading rarely mentions the possibility that transactions might fail. Indeed, the same advice was peddled in countries with working legal systems and those without such institutions. Some of the transitional countries recently have begun to restore a European legal system, free of “political and economic safety valves - the legal means of last resort by which Party and state authorities could avoid their own rules,” in the words of Daniel Cole (Cole, 1998). To the east, in Russia and the other parts of the Former Soviet Union, there was no rule-of-law tradition to revive.

There must also be basic trust within society that trading regimes are administered in a fair manner and that allowances represent real commitments to reduce emissions. Particularly since air is such an ephemeral commodity, these are transactions that can easily be abused. The possibility of abuse becomes clearer when you consider that emission trading can result in very different environmental standards for like industries. If the system works, plant A will pay plant B to reduce its emissions, instead of doing so itself. The potential bottom line is a series of varied requirements that hopefully refer back to the trading transaction. But what if Plant A is owned by the most influential politician in the country, in a culture accustomed to helping out privileged people. It’s easy to obscure the fact that the grant of discretion to Plant A to pollute less is not based on a legitimate trade, and the outcome benefits the owner of the plant, not the environment. Nordhaus has pointed this problem out in the context of global CO<sub>2</sub> emissions trading:

*An emissions-trading system creates a scarcity where none previously existed and in essence prints money for those in control of the permits. Such wealth creation is potentially dangerous because the value of the permits can be used for non-environmental purposes by the country’s leadership rather than to reduce emissions. It would probably become common practice for dictators and corrupt administrators to sell parts of their permits, pocket the proceeds, and enjoy wine, partners and song along the Riviera. [To illustrate the perils,] [a] Russian scientist recently reported the people in Moscow were already considering how to profit from the ‘privatization’ of the Russian carbon emissions permits. Alternatively... [I]f Nigeria could sell its allowances... [they] could easily sell for between \$0.2 and \$2 billion each year of hard currency. This in a country whose non-oil exports in 1999 were around \$600 million (Nordhaus, 2002).*

People in the countries in transition are unusually aware of this possibility; their experience includes many years of corruption and under-the-table differential treatment.<sup>9</sup> The environmental experts I’ve worked with in Central Europe want the assurance that a program that essentially grants discretion<sup>10</sup> to certain industries to emit at lesser amounts than others will not be hijacked to serve the purposes of people in power.

Confidence in emissions trading transactions has been developed in the United States through a high level of transparency. Competitors, NGOs, and public interest groups can monitor trades and know relatively quickly whether or not industry is meeting its commitments, a sort of “trust but verify” approach. Some sort of appropriate safeguard would be appropriate in all implementing countries. This does not mean that the exact protections contained in U.S. law must be replicated. For example, in Western Europe, the public is more tolerant when industry and government sit down to negotiate, so Central European trading

<sup>9</sup> Wedel (2001) has written eloquently about the breakdown in social norms that happened first in the context of the German occupation of Poland and then in the “twilight world of nods and winks” that characterised the period of communism. Wedel (1986) covers these issues in greater depth.

<sup>10</sup> Although a trading program can be understood as a transaction, it can also be understood as a grant of discretion to some actors to pollute more (or less) depending on whether they are buyers or sellers of allowances. Otherwise, they would all be held to the same standards. The variability in their requirements is what creates opportunities for corruption.

programs might work without as much transparency as the United States demands. On the other hand, architects of any trading program cannot ignore the legacy of the Soviet period, especially in countries struggling with endemic corruption.

The final area of serious weakness in the support structure for emissions trading in the former Soviet bloc is monitoring—knowing what pollutants and in what amounts are released into the environment by particular plants. Although one can argue about the degree of precision that is necessary, it is beyond dispute that regulators and the public must be assured that real, not imaginary, pollution reductions are being traded. Counting through monitoring can be costly. It requires good equipment, but also a level of integrity (it's as easy to turn off monitoring equipment at inconvenient times as it is to turn off pollution control equipment). It also requires that the monitoring be of plant-specific emissions, not of ambient conditions as is common in many countries.

These are the factors that have prevented the experiments in market-based instruments from developing into full-fledged programs for controlling environmental pollution. Although there has been much trumpeting of the efforts, there has been far less written about actual outcomes, and a seeming reluctance to admit the importance of these issues, except to vaguely caution that market-based instruments are effective if implemented properly and under the right conditions. Most important, little of the literature acknowledges that those conditions are rare outside the Western democracies.

## 5. WHAT ABOUT THE DEVELOPING WORLD?

If transparency, accurate monitoring, a working legal system, and realistic incentives to trade are scarce in transitioning economies, the problems run much deeper in the developing world. There are fewer people with the necessary skills and experience to implement these sophisticated programs, the available talent is generally concentrated in capitals rather than field posts, monitoring equipment is in short supply, even baseline data are unreliable, and informal and even institutionalised corruption is rampant.

Despite this, a few advisors have compounded the confusion by holding out the tantalising, but unsupported, hope that adoption of economic instruments might even eliminate the need for regulatory bodies and enforcement programs.<sup>11</sup> Another claim that is totally at odds with empirical evidence from the United States is that economic instruments as a group substitute for efforts to enforce compliance and “tend to have lower institutional and human resource requirements than command and control regulations” (Panayotou, 1994). Perhaps this is true in an ideal world or a model, but the assertion can't be backed up with experience, particularly in the gritty conditions in the developing world and the countries in transition.

The discussion above details the institutional gaps that make viable economic instruments a long-shot. But my colleague, Clifford Russell, would argue that even the pure economics arguments are deficient because they usually assume a regulator with complete knowledge of costs and a complex mathematical model to determine the cheapest solution, or that environmental ministries can and will use costly, time-consuming

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<sup>11</sup> Theodore Panayotou of Harvard University has argued that economic instruments take full advantage of the self-interest and superior information of producers and consumers without requiring the disclosure of such information or creating large and costly bureaucracies. See, for example Panayotou (1994).

trial and error to find the appropriate charge or permit a total that exactly meets the desired standard (Russell, C. and Vaughan, W., forthcoming).

We have also pointed out how misleading are the arguments for using taxes or levies to achieve environmental protection goals. It is far from easy to collect this revenue in a reliable way. Efforts to collect sales and income taxes in most of the countries in which these ideas are proposed already encounter the difficulty of monitoring sales or wages, and corruption. Taxes on pollution raise the same collection concerns, and additional ones also, as they are highly dependent on good environmental monitoring. Pollution discharges generally must be measured by special equipment as they occur, monitoring capability does not exist in much of the developing world.

The more fundamental question is whether or not the governments of the developing world have the political will to impose and actually collect charges significant enough to force industry to seek new technology. After all, many of these governments have insulated certain firms from market pressures by the equivalent of soft budget constraints. In other places, firms are accustomed to benefiting from loans made on the basis of connections and favouritism, rather than sound business principles and sober assessment of credit. Using the market to spur technological change is only plausible if the many ways in which market forces are undermined can be ruled out.<sup>12</sup>

In the final analysis, market-based instruments do offer some highly desirable features when appropriate conditions exist. To make them work, however, requires data gathering, mathematical modelling, and monitoring or auditing of emissions, skills and understanding in both government and industry, and considerable political will, a tall order in the small, understaffed, and under-funded environmental ministries of much of the world. This hardly makes MBIs the free lunch they are made out to be.

## **5.1 The case of China**

A number of donors and advisors have focused on China as a place to introduce emissions trading. Their logic echoes the arguments previously heard in both the countries in transition and the developing world. China is developing a market economy, and it presents all the dilemmas of the developing world that create a compelling rationale in favour of the maximum efficiency for environmental regulation. It is not a country that can afford wasted effort and it is confronted with significant environmental health problems. Human exposures to harmful pollutants are so severe and unrestrained in some cities that western governments are conducting epidemiological studies in China that cannot be conducted elsewhere.

## **5.2 SO<sub>2</sub> emissions trading and conditions in Taiyuan**

Typically, China pilots or tests new ideas for environmental control before they are adopted for nationwide use. China's environmental agency, SEPA, has made the development and piloting of SO<sub>2</sub> emissions trading programs a priority, building on on-going efforts of a number of prominent Chinese environmental experts including the research institute Chinese Research Academy for Environmental Science (CRAES), Ma Zhong of People's University Beijing, and various other universities and institutes. This has resulted in a series of efforts to try the ideas out in various parts of China. In the last 10-15 years, a number of Chinese

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<sup>12</sup> Financial Times, New York Times and other newspapers have reported repeatedly on lax banking practices in China. See, e.g., New York Times, February 1, 2002, "Bank of China's Mounting Problems," reported by Elisabeth Rosenthal: China's most prominent state bank, the Bank of China, was hit first by a report from China's National Audit Office, which found that \$320 million of bank funds had been diverted from several branches of the bank through "unlawful loans, off-the-books business and the unlawful granting of letters of credit and issuing bank bills," and then by a lawsuit between the Bank and former clients in New York. American bank regulators said an investigation begun in 1999 had turned up the same kinds of irregularities at Bank of China's United States operations during the 1990s. Eventually this led to the dismissal of one of China's most influential bankers.

cities have had some experience with tradable permits.<sup>13</sup> Elements of these parallel efforts toward knowledge creation and understanding include US Environmental Protection Agency (EPA's) multi-year partnering with SEPA to understand and put into place the elements of a market-based approach to controlling sulphur dioxide emissions and the damage they inflict. SEPA, EPA and others most recently sponsored a conference in Beijing to consider progress to date and challenges ahead.

Another effort has been developed over an approximately five-year period in collaboration with the U.S. NGO, Environmental Defense (ED). ED has worked in two industrial cities: in Benxi to draft tougher air pollution legislation based on the U.S. acid rain model, and in Nantong to develop a demonstration SO<sub>2</sub> trade whereby a light manufacturer can expand operations in exchange for contributing funds for pollution control to a local power plant. ED is also working with China's largest power generator, State Power of China (sic).

The effort I am most familiar with is an Asian Development Bank-funded project in Taiyuan, Shanxi Province. Since Spring 2001, an RFF team has been working with international and domestic experts to demonstrate the feasibility of emissions trading among large emitters in Taiyuan, the capitol of Shanxi Province. The Taiyuan project and ED efforts were widely reported in the press, including an extremely favourable mention in *The Economist Magazine* in a story dated May 9, 2002.

### 5.3 Taiyuan conditions/Chinese standards

Taiyuan, with a population of 2.7 million, is a heavily polluted industrial city in the coal belt of northern China about 500 kilometres southwest of Beijing. With mountains on three sides, Taiyuan traps air pollutants much in the way that smog is contained in Los Angeles. Particulate matter (PM) and sulphur dioxide (SO<sub>2</sub>) represent a serious public health threat. SO<sub>2</sub> concentrations averaged 200 ug/m<sup>3</sup> in 2000 (a representative year), more than three times China's Class II annual standard (60 ug/m<sup>3</sup>). Some data indicates that SO<sub>2</sub> emissions have been relatively flat despite economic growth.

Current pollution policy sets standards for stack gas concentration of SO<sub>2</sub>. As there is currently no reliable monitoring, pollutant concentrations are based on self-reported data from the enterprises and periodic stack testing by the local Environmental Protection Bureaus (EPBs). These estimated concentrations are combined with limited data on pollutant flows to calculate mass emissions from the enterprises, which form the basis of a small emissions levy (\$25/ton), whose proceeds support the local EPB's activities with the balance returned to individual enterprises to finance their pollution control investments.

China has worked for a decade to develop a new, more sophisticated mass-based system – the so-called 'Total Emissions Control' (TEC) – as a supplement to the existing stack-gas concentration standards, "but has only recently achieved the capacity to implement *pilot* mechanisms reflecting the concept" (Smith, 2003 - emphasis added). The TEC system is similar in many ways to individual facility-level caps on SO<sub>2</sub> emissions imposed under Title IV of the U.S. Clean Air Act (1990).

Consistent with the policy of "experiments," the Taiyuan city government began experimenting with emissions permits and earlier pilot versions of the TEC in the 1980s, including a 1985 local regulation. The city conducted experiments with emissions offsets and (administratively-determined) trading in the mid 1990s. In 1998, the Taiyuan city government issued "management rules" for TEC, including a provision

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<sup>13</sup> The experience as of 2000 is collected in Wang Jinnan, Yang Jintian, Ma Zhong and Stephanie Benkovic, eds (2000). Note there that Chen Fu, Gao Shuting and Luo Hong (2000) characterise the trades as of that date as having a "strong administrative flavor... participated by the various government agencies – no real market has formed".

for “permit exchange,” a form of emissions permit trading. The Taiyuan EPB has issued about three dozen updated permits with TEC-based limits to large enterprises.

#### **5.4 Institutional issues**

Conceptually, market-based controls for environmental purposes are attractive to Chinese policymakers because the idea fits the general thrust of Chinese economic policy – the push toward a market economy “with Chinese characteristics”. But there is still a disconnect between policy and on-the-ground conditions. Much of industry continues to be owned in whole or in part by some part of government, an inherent conflict of interest that bedeviled other socialist economies. In similar economies, the environmental regulators’ lack of independence significantly impacted their ability to enforce environmental requirements, particularly when environmental requirements collided with other government goals such as production targets or full employment.

Other institutional challenges are also very similar to those found in the countries formerly dominated by the Soviet Union. Despite the interest expressed in Chinese environmental policy circles for using market-based instruments, there is still a considerable learning curve to be overcome by officials and also by industrial managers. Chinese officials do not appear to understand the connection between environmental enforcement and the prospects for a robust trading program. Indeed, most observers agree that, “despite China’s rapidly evolving and complex network of environmental policies and laws, compliance with environmental regulations remains low” (Karasov, 2000).

There is little if any experience in the details of complex markets to trade intangible commodities. As noted above, trades to date in other parts of China have been administratively determined, which fits the comfort level of the Chinese. Many in Taiyuan wanted to do the same. In addition, Chinese officials sometimes appear to have the impression that trading is a costless way of achieving environment reductions; there has been less emphasis than I think warranted on the plain fact that in a trading system, someone, somewhere, must engage in concrete emission reduction practices, which are likely to be costly. In sum, the institutional factors would argue against the success in China of market-based instruments, and particularly of emissions trading.

#### **5.5 What was accomplished in Taiyuan?**

A large part of the effort in Taiyuan and more generally in Shanxi Province, was spent developing understanding and skills necessary for emissions trading, and working to develop a consensus in support of using emissions trading programs and of the details of how they work. There were multiple discussions with officials of the local and provincial EPB, Taiyuan City government, Shanxi Provincial government and local industry.

In view of the highly top-down nature of Chinese authority, it was never clear, however, the basis for the attention that officials paid to these ideas – was it genuine interest or was it because they were expected to appear interested. While the central government through SEPA clearly expressed interest in examining SO<sub>2</sub> trading, the motivation for Taiyuan and Shanxi Province was less obvious to outsiders.

One unsurprising motivation may have been the financial clout of the Asian Development Bank (ADB). Activities in Taiyuan were funded as a small part of a much larger loan package from the ADB to finance environmental technology improvements. To some extent, the trading experiment reflected the interests of a specific ADB environmental economist who initiated a number of efforts that began when Harvard Institute for International Development (HIID) was tasked to examine prospects for market based environmental instruments in China. The Taiyuan project was formulated by ADB and RFF was selected to run it. The issue of the degree of Taiyuan/Shanxi motivation is a particularly important question, since

sustained, continuous efforts will be necessary to carry the ideas through, and the program itself was funded for roughly two years.

There were three actual accomplishments, beyond broad discussions. The Taiyuan EPB enacted a regulation that provides the legal basis for emission trading; RFF and US EPA developed an allowance tracking system (“ATS”) and an emission tracking system (“ETS”); and the Taiyuan EPB issued allocations through 2005 of the goals that had been established through the 10th (2000-2005) 5-year plan.

It is hard to assess the significance of these accomplishments. On the one hand, the passage of legislation signalled an intent on the part of the EPB to move forward. On the other hand, as noted below, the regulation had significant defects. More important, writing a law in China does not have the same significance as it might in, for example, the western democracies. China has not historically been a law-based society. China has enacted a number of environmental laws in recent years but the mere writing of laws says little about the force and effect of those laws on actions. And unlike, for example, the United States, there is no available judicial remedy should the government fail to implement or enforce laws (judges are appointed by and answer to the local people’s congress, often the same body that controls provincial industry). Nor is there a free press to assess whether the government is meeting the standards it sets for itself.

The allowance tracking system, developed by the foreign advisors, is an important technical component, essentially the accounting system for the trading program. It keeps track of account information, authorised account representatives, allowance holdings, and allowance transactions.<sup>14</sup> It was created as a tool for the Taiyuan EPB to manage the emissions allowances, but it is really just a tool, and says little about the likelihood of compliance with a trading system, much less about success. The goals and allocations are discussed below.

## **5.6 What lessons can be learned from the Taiyuan experiment?**

Genuine progress toward environmental reductions using any tools, including market-based instruments and emissions trading schemes, is, in my view, hampered by the unrealistic way in which pollution reduction goals are set in China. This, and lack of serious efforts to pursue compliance and apply the pain of enforcement removes the incentive industry might have to participate in schemes to reduce the cost of environmental compliance and reduces the seriousness with which industry might consider supporting such plans. Finally, the specific regulation passed in Taiyuan to support emissions trading has serious deficiencies, in addition to questions that can be raised about what is the meaning of laws in China.

### **A) Overly ambitious pollution reduction goals accompanied by a history of retreat would challenge the effectiveness of any environmental tool**

The Tenth Five-Year Plan for Taiyuan calls for 2005 SO<sub>2</sub> emissions to be reduced by about 50 percent below 2000 levels, a goal widely seen as extremely ambitious.<sup>15</sup> This may be because of the way the goals

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<sup>14</sup> One allowance is equal to one ton of SO<sub>2</sub> emissions and may be used to authorise SO<sub>2</sub> emissions during the year for which it was allocated or for subsequent years. The key components of ATS are:

- Emission trading subsystem to trace the trading status among the sources;
- Allowance deposit and reuse subsystem to verify the deposit and use of allowances;
- Allowance auction subsystem to trace the auction of allowances;
- Comprehensive accounting subsystem to comprehensively verify the actual emissions and the effective emission allowances of the sources.

<sup>15</sup> It appears that previous goals were equally ambitious, for example calling on China to hold total pollutant emissions to the 1985 level by 2000, and bringing them even lower in the designated “key” pollution control areas. But at the same time that they provide data that purports to support the claim that SO<sub>2</sub>

were set. Every society decides in its own way what are its goals. Five year planning is a process well-rooted in PRC government and culture, and there is no reason why five year planning cannot generate achievable goals that can be met in a cost-effective manner. But the Chinese emission reduction goals are set in a process divorced from much realistic consideration of feasibility. The central planners appear to work in somewhat of a vacuum and it is not clear what their reference points are for the numbers they select. Once formulated, it appears that goals are announced to the EPBs and industry, who otherwise appear to be excluded from the goal setting process, and then allocated to specific industries.

A related problem is how goal setting interacts with the time frames contained in the five-year plans. The specific goals seem currently to be developed and then re-thought within the specified time for compliance, that is, within the five-year period in which they are supposed to be achieved, in this case well into the 2000-2005 period. As a result, industry has no lead-time to adjust to the targets or to plan to undertake its share of the responsibilities. This can undermine the process of progress.

Even in the absence of a learning curve, the goals set for Taiyuan would require extraordinary efforts that normally are time and resource intensive. There is also nothing wrong with ambitious goals, but they are less likely to succeed when they are understood from the very beginning by the EPBs and industry to be unachievable.

Unsurprisingly, even when goals are firm, experience indicates that industry needs adequate time to plan environmental investments. The extended period in which goals are set in the U.S. and then built into plant-specific permits is one way in which industry is put on notice of its ultimate responsibilities and has time to engage in the planning, financing, and specific activities (to identify, purchase and install technology, for example, or make in-plant process changes) necessary to come into compliance. These decisions and activities include whether to install technology, or make other adjustments to reduce emissions or to purchase allowances. Our experience indicates that even after industry is able to identify appropriate technology, the identified technology isn't always immediately available, to give just one problem. Similarly, financial analysis is necessary in order to determine whether to purchase allowances and at what price. It is certainly appropriate to make adjustments in or to update allocations every five years, but sources need enough certainty to properly plan investments.

Moreover, experience in the United States suggests that if industry senses that goals will be eased, some will wait until the last minute to undertake their own responsibilities, on the chance that they won't have to make the environmental investment. Goals and targets that consistently overreach are likely destined to be modified as reality sets in or at the stage when industry does have some form of access to the decision process. This in turn encourages industry to wait out the goal setters (the situation may be even worse when the goal setters, the enforcers and the owners of industry can all be traced back to the same source, the government; then, decisions are made in inner councils that sort out which value or demand will take precedence).

If China is interested in real emissions reductions, it could build explicit consultation with industry and with environmental regulators, enforcers and the public into the process during the time the goals and targets are being set, and make the entire process more transparent and publicly accessible. Emission

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emissions were reduced in that time period as a consequence of the pollution levy, Jing Lixin, Zhu Jianping and Fu Deqian (2000), in *SO<sub>2</sub> Pollution and Acid Rain Monitoring in China*, at p. 68 acknowledge problems: "However, the real SO<sub>2</sub> reduction effect may be not as good as the data show. This is because ... the amount of SO<sub>2</sub> emission is [derived] from the energy consumed and is mainly based on the reporting data of enterprises (the data will be smaller than the actual one since SO<sub>2</sub> is charged and enterprises have self interest to report less)." In truth, it's difficult to get reliable data, and there is reason to believe that lower officials often provide the data they believe higher officials want to see.

reduction goals appropriately represent a combination of both political and technical targets. But the relatively closed process suggests China is weighted toward appearance, not reality, much like the “show laws” of the former Soviet Union. A more transparent process would increase the amount of knowledge and data available to the planners, and begin the process of setting targets that are ambitious but achievable. A more inclusive process might increase the planners understanding of what is truly feasible, what technology is available, what the costs might be of compliance, and other factors that affect the likelihood of achieving genuine reductions. On the other hand, the greater the isolation of the planner from critical information and data, the more likely are targets to be set that cannot be met.<sup>16</sup>

### **B) Poor history of environmental enforcement**

China’s industries have not experienced vigorous environmental enforcement. Interviews with enforcement personnel disclosed their primary objective was to collect the environmental fees that provided funding for the EPB.<sup>17</sup> Secondly, they responded to complaints about particularly egregious environmental problems.<sup>18</sup> Extreme cases might lead to temporary shut downs of plants, much as pilots on transatlantic flights asked smokers to refrain from smoking for 20 or 30 minutes when the cabin was particularly full of blue smoke. BNA quotes Xie Zhenhua, Chief of SEPA, who has said that China will “close down heavy polluting, unprofitable, small and backward factories,” and ban “heavy-polluting fuels” from downtown areas of major cities (Bureau of National Affairs, 2003). The difficulty is the tension China clearly feels between its environmental goals and its notable concern about labour and social unrest.<sup>19</sup>

When pressed for explanations about their efforts, enforcers in Taiyuan expressed some embarrassment about the situation. For example, we were told that enterprises were essentially rated for their compliance. But an enterprise could consistently “flunk” by getting a low score, year after year, without penalty or consequence. This is hardly the kind of signal that forces enterprises to consider finding cheaper means of achieving their environmental requirements.

As part of our efforts, we examined with Taiyuan environmental enforcers what enforcement tools were available to them. These were, as noted, mostly the power to collect fees and fines, and to shut plants down – almost always temporarily<sup>20</sup> – to curb immediate exceedances that people (including communities)

<sup>16</sup> This reasoning assumes that China can and will work out the conflicts of interest between industrial and governmental goals.

<sup>17</sup> Chen Fu, Gao Shuting and Luo Hong (2000) point out that because the fees are “too low,” “many enterprises would rather pay emission fees than remedy their pollution problems, which will not lead to effective SO<sub>2</sub> emissions control among polluters.” Under the new Air Act, Article 48, Chapter 6, the practice that enterprises could pollute in excess of national standards provided they paid fees may change; if emissions exceed the discharge standard, they must be reduced within a specified deadline, and at the same time, the polluter must pay a fine (between 10,000 and 100,000 China Yuan Renminbi (RMB)) to the provincial/local EPBs. See Beverage & Diamond, P.C. (2001). Implementing sub-laws or regulations are still pending.

<sup>18</sup> The so-called “letters and visits (xinfang)” method of citizen notification of officials of problems such as construction noise, dust, etc is active in Taiyuan. See also, William P. Alford and Yuanyuan Shen (1998), at page 420. The process in response to complaints is to send EPB employees out to take measurements using, e.g. mobile monitoring gear, binoculars, and noise readers. The remedies are to (1) ask for corrections; (2) close facilities; or (3) impose fines. Two levels of appeal are available to enterprises or others who dispute these findings or the remedy. The hierarchy of appeals include administrative appeals, appeals to the city EPB, the province and then to a court.

<sup>19</sup> This is what the Chinese call the “double burden requirement,” when economic development and environmental protection come into conflict. See also, Pan (2002).

<sup>20</sup> Highly polluting industry in Beijing is being physically moved to new locations, in anticipation of the Olympics.

perceive as threatening. It would help to give enforcement personnel more “tools” which could be used to achieve compliance goals, which could include civil and criminal penalties, the use of compliance schedules, etc.

Whatever tools are used, enterprises must receive a steady, reliable message that the environmental requirements are serious and require continuous efforts on the part of all involved toward meeting the regulatory goals. If it is known that the environmental regulator has only weak tools (or motivation) for catching violators, the probability of getting caught appears to be low, reducing substantially the chances of the program being a success. But it would also help if enforcers were independent enough to enforce the rules without fearing that they might arouse powerful interests and endanger their own wages and social benefits.

Finally, as noted above, experience in the western democracies indicates that enforcement is more likely to succeed if sources know what their real and actual targets are. As noted above, the impact of a process in which allocations are not known until the early part of the five year period, and might be modified during that period, may be to discourage enterprise compliance; enterprises may be more likely to take a “wait and see” attitude, than to invest for pollution control. Allocations can be updated every five years, but a process that appears to move both directions – setting goals but then moving away from them -- sends the wrong signals.

Until the message is made clear to enterprises that compliance is mandatory (that they must either install control technology or purchase emission allowances), it is difficult to predict whether enterprises are likely to take an emission trading program or any other regulatory program seriously. When the message is that compliance obligations seem to be relatively malleable and potentially subject to change, particularly through negotiation, the main incentive for trading -- the opportunity for cost savings against real expenditures toward compliance -- is diminished. Few businessmen, Chinese or otherwise, make investment decisions based on theory.

### **C) Inadequate penalties**

The regulation passed by Taiyuan lacks teeth. Paragraph 23 of the Taiyuan regulation sets a yearly cap of 30,000 Yuan (roughly \$3,586 USD, as of April 3, 2003) on the total penalties that can be assessed against polluters.<sup>21</sup> The obvious difficulty with this language is the predictability of instances in which the cost of compliance (either installing technology or purchasing allowances) is greater than the maximum allowed penalty. At that point, the incentive for enterprises will be to be out of compliance and simply pay the capped penalty. This defect and its practical consequences was noted by enterprises during a public meetings in Taiyuan in November, 2002. To some extent, Taiyuan’s discretion to set appropriate penalties was restrained by overriding National Chinese air laws that set a penalty cap, which means that Taiyuan cannot fix this problem by itself.

A deeper question, however, is to understand how much weight should be placed on the passage of a law, and the significance of a regulation, in a society that has not historically been governed by laws. Rule of law was eroded in Central European Countries like Poland and Hungary, but not entirely extinguished; despite many years including World War II and the Soviet occupation, that made people cynical about law and encouraged the population to work their way around rules as best they could, there is an historical experience to fall back on. The picture is more mixed in Russia where for many years, law was applied when it was in the interests of the authorities and ignored otherwise. China has never been a law-based

<sup>21</sup> The specific language is as follows: “If the polluters’ actual annual SO<sub>2</sub> emission exceeds the SO<sub>2</sub> emission allowance they hold at the end of the same year, they shall be fined by environmental protection department 3,000 to 8,000 Yuan per ton of excess emission, and the maximum penalty shall not exceed 30,000 Yuan.”

society. Environmental laws are new, there is little experience applying them, and, as noted above, when they are ignored, no independent judiciary exists to step in to give the rules credibility.<sup>22</sup>

In sum, my own view is that the Taiyuan project provides no evidence about the ultimate success of market-based instruments in China or any other developing world context. If anything, because there is no independent enforcement, the rules are so riddled with practical exceptions, monitoring is so weak and the basic incentives lacking, the Chinese situation is much more like the countries in transition before 1989, than after, in that China lacks basic institutional prerequisites and domestic motivation that might make effective emissions trading possible.

## **6. HOW CAN GENUINE ENVIRONMENTAL PROGRESS BE STIMULATED IN THE DEVELOPING WORLD?**

Being realistic about the challenges to be faced in the countries in transition and the developing world does not mean abandoning hope for environmental improvement. A concerted but realistic effort to support these countries as they tackle their environmental challenges is necessary, if for no other reason than the cliché that pollution respects no borders, but more to the point, because many face the health consequences of heavily polluted air and water.

I would start with the question: is it realistic to expect that countries only beginning the process of environmental protection can start with the most difficult environmental instruments? As I strongly believe the evidence shows, the answer to this question is, “no,” the next question is, what can be done? Institutional inadequacies such as low functioning legal systems, historical experience (or inexperience) with markets, distorting and often institutionalised corruption, and public acceptance certainly can be fixed, and it is important to start to do so. But changing these fundamentals will take a long time. What can be done in the meantime?

Russell and I have suggested in two articles cited in the bibliography that the donors and advisors start instead by thinking small, and considering alternative approaches. One way is to encourage, rather than disparage, incremental improvements and pragmatic goals, even if they are not the most efficient approaches. Countries might consider a transitional or tiered approach that will take into account existing capabilities and institutions, and explicitly acknowledge that a long learning curve lies ahead with inevitably uneven implementation and slippage from time to time.

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<sup>22</sup> To give some sense of the cultural issues involved with introducing instruments of any kind into China that harness private action in support of public goals such as environmental protection, commentators have noted that the Chinese word for “rights” was imported from Japan in the early 20<sup>th</sup> century and, in contrast to the hundreds of years of western history involving this concept, has no previous meaning or history for the Chinese layman. This is because of the nature of the traditional social relationship between the individual and the state. “In ancient China, and ever since, to rule is tantamount to keeping order (zhi) and failing to rule is chaos (luan), which brings all kinds of disasters” (Sisci 2001). Thus, this new and evolving role for the state, particularly in terms of environmental controls, is quite different from China’s several thousand year history. The experience emphasises the imperative of a continuing state role, and makes it difficult for Chinese regulators (and the Chinese government) to accept the more hands-off aspect of trading with which we are familiar in a more deeply entrenched market economy. It also does not provide much grounding for the role of government that backs up a trading scheme.

A concrete way to think about this would be a tiered approach. Countries with a low level of institutional capability and environmental protection experience might start with simple discharge-control technology requirements, which are hard enough when experience and funding is lacking. Tools would be selected by asking what is achievable and relatively easy to monitor. Ideally, success will breed regulatory confidence and more success.

Countries with a bit of experience under their belts could move to technology-based discharge limitations similar to those found in the U.S. Clean Water Act. They might establish discharge standards, such as plume opacity, which can be easily monitored, or put in place deposit-refund systems, not only for beverage containers but also for car batteries, tires, and dry cleaning fluid. Only the highest functioning countries should attempt the most difficult of the economic instruments: making discharge permits tradable or charging per unit of pollution discharged.

Another approach would be to find examples of small, admittedly imperfect, efforts that seem to be working, find out why they are achieving some measure of environmental progress, and build on them. There are a number of interesting such examples. These could include China's apparent success with energy efficiency and the Kitakyushu, Japan effort to control air pollution that started when housewives noticed that newly washed clothes on the Kitakyushu clotheslines were instantly turning black.

Air quality in Delhi, India, a city that was incurring an annual health cost of ambient air pollution on the order of about U.S. \$ 200 million, is another. RFF is about to undertake a study of this, to see what lessons might be more broadly applicable. A 1998 Indian Supreme Court order required Delhi's public vehicles (buses, taxis and three-wheelers) to convert from diesel to compressed natural gas (CNG) fuel, and public vehicles more than eight years old to be retired. The public interest environmental organisations were happy with the Court's ruling, but the Court was demanding costly and inconvenient changes, particularly for some parts of Indian society without great resources. The Court's decision was opposed by bus, taxi, and three-wheeler operators and by numerous special interests including diesel fuel dealers, companies that own and operate diesel busses, parts of the government such as the Ministry of Petroleum and Natural Gas and the Delhi Administration, and competing users of CNG. Lines of three-wheelers waiting for CNG fill-ups sometimes stretched for kilometres, forcing the drivers to spend hours away from their livelihood and families. Various attempts were made to systematically discredit CNG technology and others argued that the Court's solution was not cost effective. These dynamics explain why the apparent result, the current phase out of diesel and increasing reliance on CNG, was not necessarily predictable or expected. In view of this, how was it that the phase-out took place, and what might this experience teach future environmental regulators, both in India and elsewhere?

The most important thing the donors and advisors can do is to encourage the development of credible behavioural rules, mechanisms for verifying and encouraging compliance, and a culture in which compliance is the first choice of action rather than the last.

## 7. CONCLUSION

Institutional capacity should not be an eternal barrier. Regulatory capacity and confidence can be developed in a number of ways. In my view, the effort to promote market-based instruments has been a distraction from the urgent task of developing appropriate actions with a likelihood of success, that would, in turn, build the requisite institutional confidence.

The suggestion (connected with development assistance dollars) that market instruments should be the first goal set the standard for success too high, and may have created a crisis of confidence. The developing countries are not environmental laboratories; they are real places with severe problems and limited resources. They are not the right places to insert theories that have only been tested in models and in the minds of the people who thought of them, where confounding facts and poor conditions can be assumed away.

Environmental protection is a gritty and difficult business. Theory has much to offer, but in the end, local traditions, culture, institutions, and infrastructure will determine the success of any policy. Policy selection should not be a function of fads or ideology. Like good doctors, the Environmental Consensus should examine the patient before, not after, it prescribes the cure.

If credibility and success are built incrementally, institutions, like people, have the opportunity to practice and to learn from both their successes and their mistakes. Environmental policy is a particularly good practice ground because clean air and clean water is something most societies want; in many places, it will be possible to find the requisite public support for undertaking reasonable steps.

Taking more measured steps does not have the same sense of adventure as a great environmental leap forward. But it will result in real, although initially small, environmental gains, and could be accomplished without losing sight of the ultimate goal, which is to reach the goals of environmental quality at least cost to society.

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