

# Task Force Report on Environmental and Natural Resources Pricing and Taxation

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## Introduction

China's impressive and historically unprecedented growth performance has been the envy of developing and developed nations alike. Yet, it is now widely recognised that China's growth has come at great and growing environmental and social costs and cannot be sustained in the long run. Moreover, how China chooses to manage its economic growth has far reaching consequences for *global* environmental assets. Indeed China's increasing demand for energy, commodities, and raw materials is already affecting world prices and stocks, and China has become a leading contributor to global emissions of CO<sub>2</sub> and SO<sub>2</sub>. The sheer scale and pace of economic development means that China has taken the world into uncharted territory.

Market-oriented reforms have been a driving force behind China's economic growth. But market liberalisation is not a panacea. It is increasingly clear that market forces alone cannot be counted on to perform certain regulatory functions, particularly with regard to environmental protection and poverty alleviation. This is clearly recognised by the current leadership, which demonstrates great foresight in championing the "Scientific Development Concept" as a guide to further development. Government has an essential role to play in complementing and guiding markets to deliver a better *quality* of growth for present and future generations. This note recommends that – in an increasingly market-oriented economy – fiscal incentives will enable the government to perform this role more effectively.

China's fiscal system is at a historical cross-road: ongoing fiscal reforms offer a unique opportunity for improving coordination between environmental and development goals in order to exploit win-win options. The growing severity of environmental problems, which threatens social stability and the sustainability of economic growth, makes this a policy imperative.

This report aims to provide practical guidance to policy makers on how public finance can support sustainable development by integrating economic, environmental and social objectives through realistic reforms in pricing, taxation and expenditure policies. It will delineate the role of public finance in environmental protection and highlight linkages with other policy priorities. It will show how environmental fiscal instruments (EFIs) can yield multiple dividends in terms of increased economic efficiency, reduced environmental damage, improved public financial management, and poverty alleviation.

The advice given here is aimed at senior policy-makers in environmental as well as fiscal, pricing and sectoral fields. The focus accordingly is on practical and strategic

policy issues rather than technical aspects. The aim is not to be comprehensive: the focus is on priority policy areas where the environmental stakes are high, where there are clear win-win opportunities between environmental protection and economic development, and where EFIs can significantly contribute to strengthening ongoing reforms. Consequently, our recommended policy interventions focus on the water and energy sectors. Some issues are not discussed in depth and may merit closer attention (e.g. congestion charging). But the selected topics do cover a wide range of the conceptual, empirical and practical issues encountered in applying EFIs in China. We hope therefore that this report will be useful as a general of source reference for policy makers on applying EFIs.

## **I) Background: An Historic Window of Opportunity**

A strong political mandate, a clear rationale, and the context of economic transition and fiscal reform combine to provide an historic window of opportunity for putting in a place the building blocks of a comprehensive environmental fiscal system.

### **1. A strong political mandate**

In the latest annual report on the work of the Government, Premier Wen Jiabao recognised the extreme severity of water and air pollution problems and pledged that efforts to control air and water pollution would be prioritised and boosted. At the same time the aim of establishing a coherent and comprehensive public finance framework “which matches the market driven economy step by step” has been explicitly spelt out both by the Communist Party of China in their “Proposal for the 10<sup>th</sup> Five Year Plan” and by Premier Wen Jiabao in the 2005 report on the work of the government. In addition to this clear political mandate, wider use of EFIs is warranted by the urgent need to address the pervasive environmental market failures which are the root causes of today’s severe pollution, energy shortage, and water security problems.

### **2. A clear rationale**

#### **A) Growing environmental pressures resulting from an extensive mode of economic growth**

China’s ‘extensive’ mode of economic growth – characterized by high inputs and low efficiency resulting in rampant pollution and wasteful consumption of natural resources – is pushing up the costs of economic performance. In 2005, China ranked 133<sup>rd</sup> out of 146 countries according to the Environmental Sustainability Index. China’s economy is currently 4% of the world economy in size, yet it absorbs close to a third of the global supply of coal, steel and cotton and nearly half of its cement. It is also amongst the world’s worst polluters on a local as well global scale. On a domestic level, 90 % of river reaches that go through cities are severely contaminated, and 75 % of lake water is nutrition abundant. Three in four city dwellers breathe air that fails to meet China’s air quality standards. The annual rate of treatment or disposal of industrial hazardous wastes is merely 68%, and 70% of waste-water is disposed without treatment. On a global level, China is the leading emitter of SO<sub>2</sub>, Hg, and COD, and is second only to the United States in its emissions of Greenhouse

Gases<sup>1</sup>. The economic costs from environmental degradation and pollution are huge. The Chinese Academy of Sciences estimated that in 2003, the economic costs of environmental pollution and ecological damage amounted to 15 percent of China's GDP.

What is more, environmental problems and their impacts are becoming increasingly complex. The rapid rise of municipal and non-point source pollution (NPSP) and the increase in persistent organic pollutants (POPs) has been associated with increased incidence of cancer and poses grave consequences for public health. Unlike many major agricultural countries like the US, France, or Brazil, China's agricultural and industrial areas are much more intermingled. Therefore pollution from industrial, agricultural and residential sources co-exist and interact. Thus, photochemical smog caused by industry and vehicle emissions and urban wastewater disposal have been shown to affect crop yields<sup>2</sup>. Finally, global environmental issues, especially climate change, desertification and bio-diversity, are becoming very urgent national issues.

Traditional regulatory instruments are not keeping pace with the rapid structural changes: they are quickly becoming blunt and mistargeted. The requirements of a rapidly growing economy are for the government to apply more flexible economic instruments in environmental administration. Moreover, there is a growing concern with problems that do not lend themselves readily to traditional regulatory approaches -- e.g., diffuse and mobile sources of pollution and global pollution problems. There is a need to revise the environmental policy framework to make it more flexible and responsive to changing market realities.

Finally, the demand for public environmental finance will only rise with time as environmental threats grow and the focus of public policy shifts to speeding up development of China's Western regions. The Western Development Strategy and mammoth environmental construction and infrastructure projects for transferring gas, water and electricity across the country have generated large scale financial demands relating to environmental protection. These developments call for urgent consideration of how to strengthen the central government's financial capacity in protecting natural resources and mitigating environmental disasters.

## **B) Growing social discrepancies**

The great and growing discrepancies between regions and between urban and rural areas add complexity to the interface between environment and development. In the two decades following China's "reform and open up" policy, economic development of eastern coastal regions was prioritised. Although priority is now given to development of Western regions to achieve 'balanced development', disparities continue to rise. In terms of GDP per capita, the gap between Western and Eastern regions grew from a ratio of 1:1.92 in 1980, to 1:2.59 in 2003, while the gap between Middle and Eastern regions grew from 1:1.53 to 1:2.03. At the same time, rapid urbanisation is widening the income gap between urban and rural areas. If one takes account of non-income factors such as medical care, education and unemployment insurance, the rural-urban divide in China is among the widest in the world.

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<sup>1</sup> China ranks 133 out of 146 countries on the environmentally sustainability index.

<sup>2</sup> The anticipated impacts of climate change are likely to make this situation even worse.

Since a big part of the responsibility for environmental protection lies with local governments, a direct consequence of these economic disparities is that the level of environmental protection in China's Middle and Western regions lags far behind the East. As industrialisation and polluting enterprises move westward, the west is therefore very likely to go down the path of "grow first, clean up later".

The geographic distribution of environmental wealth is in contrast to the regional pattern of economic disparities. It is in the Western regions that clean air and water and many important natural resources are found in relative abundance. Rivers flow from West to East, and wind blows from the Northwest to the Southeast.

This basic asymmetry between eco-environmental and social-economic functions poses a grave threat for environmental security. Public and private investments in environmental protection are skewed towards relatively affluent urban centres on the East coast. As a result capacity for environmental protection is weakest where it is most needed, i.e. in the developmentally-delayed Middle and Western regions. It is unrealistic to expect that such a threat can be eliminated through market forces alone. The trans-jurisdictional nature of major environmental and ecological problems calls for better coordination between environmental protection and economic development endeavours at the national level.

The growing social discrepancies also pose new challenges for poverty reduction. In 2003, for first time in 20 years, poverty had been on the increase. Natural disasters – often triggered by economic activities – have been identified as the most important and direct cause of people falling back into poverty. Indeed, the majority of the current poor are concentrated in remote western and upland areas where the natural environment is very fragile. As a result they also suffer disproportionately from environmental degradation. These two features – growing inequalities and geographic marginalisation of the poor to environmentally fragile areas – are in fact dynamically related<sup>3</sup>.

To a great extent therefore, poverty in China is environmentally-conditioned. The poor are characterised by heavy dependence on a narrow asset-base (often a single resource), and by insecure access to environmental resources such as water and productive land. Policies affecting the resource base, the assets or the income levels of the poor, and the distribution of benefits from natural resource and environment-related policies may have critical impacts on their livelihood opportunities and strategies. It is obvious therefore that environmental protection and poverty alleviation policies and programs need to be better coordinated.

### **3. The Context of Economic Transition and Fiscal Reform**

Ongoing processes of market liberalisation have in general encouraged more efficient use of all kinds of resources and use of modern technologies that are clearly beneficial in an environmental sense. However, the very success of the market mechanism in fostering growth at the same time places an increasing burden on the environment,

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<sup>3</sup> For example, China's rapid growth has resulted in increased competition for the use of scarce environmental resources such as water. This increases the vulnerability of the poor and causes conflict between the poor and more influential groups.

calling for greater public intervention to address market failure and income distributional consequences.

Current fiscal reforms and trends provide a window of opportunity for speeding up fiscal reforms and greening public finance. Government revenues increased from approximately 3.5 trillion RMB in 1992 to 26.4 trillion RMB in 2004. In recent years the annual growth rate of government revenues has been close to 20%, more than twice the rate of economic growth. Fiscal revenues will not keep on growing indefinitely at this rate. Any reform initiative involves costs: it is wise to carry out reforms when the central government's financial capacity is at its strongest, so that the costs of reform may be more easily absorbed. Moreover, the focus of public finance has shifted away from purely economic activities and towards the provision of public and social services. The combination of these two factors sets a sound basis for systematically integrating environmental sustainability concerns in to public finance.

Ongoing taxation reforms create good conditions for greening the tax system through minor adjustments in tax rates and items. Indeed environmental considerations may strengthen the objectives of some mainstream tax reforms, while revision of other mainstream taxes may create space for 'greening'. For example natural resource taxes and consumption taxes are currently under revision and may well be adjusted to include an environmental dimension. This would be a good time for example to push for a higher excise tax on vehicles with large engines. Ongoing discussions about an eventual fuel tax also raise the prospect of addressing externality issues related to fuel use.

Taking a broader perspective, EFIs can play an important role in aligning environmental sustainability objectives with the broader economic reform agenda. Consistent with ongoing reforms, EFIs are aimed at perfecting the market system. Indeed, EFIs have a logical role to play in compensating for the failure of market forces to adequately reflect environmental costs and benefits. EFIs can also make significant contributions to macroeconomic and fiscal policy reforms, namely by:

- Increasing the efficiency of resource allocation in the economy;
- Enhancing the effectiveness and efficiency of public spending programs;
- Creating options for tax shifting to achieve a more optimal tax structure, and;
- Ensuring more equitable access to public services.

Furthermore, increased reliance on EFIs is consistent with the government's commitment to fiscal stability and a neutral fiscal stance.

Finally, the general context of transition and economic growth broadens the space for environmental pricing. On the one hand, demand for environmental protection continues to grow steadily as the economy develops, while on the other hand higher levels of income translate in a higher willingness and ability to pay for environmental protection. Where income levels lag, fiscal transfers and tax relief measures can be used to induce lower prices for environmental services, while at the same time speeding up the establishment of the market mechanism in these areas. More generally and in consistence with ongoing reforms, EFIs have a logical role to play in compensating for the failure of market forces to adequately reflect environmental costs and benefits.

The current government has resorted to fiscal instruments for achieving major economic and social policy goals. An obvious example is the significant decision to gradually eliminate the agricultural tax nation wide, or the elimination and subsequent reintroduction of the textile export tax refund scheme. Fiscal instruments can be equally effective policy tools in the environmental domain.

## II) EFIs and their application in China

### 1. What are EFIs? What purposes do they fulfill?

Environmental fiscal instruments (EFIs) cover the range of fiscal instruments designed to promote efficient and sustainable use of natural resources and cost-effective pollution control or abatement. The EFI instrument mix includes three main components, which are closely intertwined:

- Public **revenue instruments** such as environmentally related and natural resource-oriented taxes and charges,
- Public **expenditure policies** and fiscal transfers, and;
- Environmental and natural resource **pricing policies**<sup>4</sup>.

At the intersection of the public budget system and the environmental policy matrix, EFIs can fulfil the following **roles**:

- **Create economic incentives** for efficient resource use and pollution abatement by driving up the cost of environmentally harmful activities or increasing the returns from sustainable approaches (e.g. environmental taxes and charges);
- **Mobilise and allocate funds** for environmental protection and natural resource management (e.g. via environmental fees and charges, and fiscal transfers);
- Ensure an **equitable distribution of benefits and costs from the management of public environmental resources**, e.g. universal access to basic environmental public goods (via public investments and pricing).

### 2. Achievements in the application of EFIs in China

#### A) Environmental taxes and charges

The polluter pays principle (PPP) has been endorsed by the Chinese government as a guiding principle for pollution management. China's long experimentation with the **Pollution Levy System** (PLS) and a variety of other instruments has generated valuable experience and a solid basis on which to future efforts can build. The recently revised PLS is one of the most comprehensive in the world<sup>5</sup>. In 2004,

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<sup>4</sup> Public pricing policies are included in the EFI policy mix since they directly and indirectly impact on environmental fiscal revenues and expenditures.

<sup>5</sup> The pollution levy is meant in theory to internalize the external costs caused by polluting behaviour, but in effect the rates are set too low to have a strong incentive-effect on polluters.

revenues raised through PLS amounted to RMB 9.4 billion. The fee on urban water resources is a further example of how environmental concerns have been directly addressed through the system of special revenues.

Strictly speaking, no single tax in China's current tax system can be labelled an "environmental tax", but several taxes are in place, which have potential impacts on environment and natural resources. Six **environmentally-related taxes** have been introduced within China's tax system: natural resource taxes, consumption taxes<sup>6</sup>, an urban construction and maintenance tax, vehicle use taxes<sup>7</sup>, a fixed asset investment direction adjustment tax and land use taxes<sup>8</sup>. These six taxes account for about 8% of national tax revenue.

The introduction of Total Emission Control, and the implementation of the Emission Permit System, provides a sound basis for emissions trading. The year 2002 saw the official launch of emissions trading demonstration activities, covering 7 provinces (Municipalities) and one business conglomerate. Although it has provided more flexibility to enterprises, problems remain regarding the initial quota allocation, consistency with existing policies, and trans-boundary trade activities.

## **B) Public environmental expenditures**

There has been a steady increase in environmentally related public expenditures over the past decade. During the period 1998-2002, 38% of total public long-term debt was invested in environmental protection and ecological construction projects<sup>9</sup>. This includes expenditures on urban environmental infrastructure; protecting the 'three lakes, three rivers'; the Sloping Land Conversion Programme; etc.

Eco-environmental Compensation Charges (EECC) have been introduced on a pilot basis since late 1980s. A more comprehensive ecological compensation scheme was introduced in the late 1990s for the Sloping Land Conversion Program (SLCP), and the Natural Forest Protection Program (NFPP), which gained 7.5 million ha of sloping land converted by investing about 55 billion RMB. In 2004, the GoC decided to spend 2 billion RMB to compensate for the ecological services provided by key forests in the following years. However it is widely recognized that this policy needs to be further improved. There are concerns specifically around the payments basis, implementation effectiveness, regional differences, and impacts on the poor.

Most significantly, the Chinese government is currently preparing to set up an Environmental Fiscal Expenditure Account (EFEA) under the public budget. This could be a major step forward in terms of improving the efficiency of public spending on environmental protection at the national level. Sub-accounts will be set up under

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<sup>6</sup> **Consumption taxes** are currently imposed on five energy-related products including: gasoline, diesel oil, motor tires, motorcycles and cars. These taxes are considered 'environmentally related' as they provide scope for environment-based tax differentiation (this is currently being discussed in policy circles, and considered e.g. for fuel taxation reform).

<sup>7</sup> The **vehicle and vessel usage tax** is not intended for environmental protection purposes but may potentially have such a function because of the differentiation according to tonnage of ships and trucks, and by type of cars.

<sup>8</sup> **Property taxes** apply to vehicle use and land value investment and are environment-related in a similar way to the consumption tax.

<sup>9</sup> Including: urban environmental infrastructure; protecting the 'three lakes, three rivers'; the Sloping Land Conversion Programme; etc

the EFEA for the following items: environment management, environment inspection, pollution prevention, natural resources protection, crude forestry protection, sloping land conversion policy, anti-desertification programs, and grasslands rehabilitation programs.

### **C) Environmental pricing**

The pricing system as a whole has come a long way in the transition to a market-oriented economy. Moreover, there have been encouraging instances of environmental concerns being explicitly considered in a pricing scheme. The introduction of a fee to recover the costs of desulphurisation treatment in coal-plants<sup>10</sup>, and the wastewater treatment fee are good examples of this. A very encouraging progression in recent years has been the increasing openness of the pricing process (e.g. public hearings).

There is a growing recognition at the centre that environmental policy can make more use of fiscal instruments. *GoC has fully embraced the concept of charging of tariffs for cost recovery.* Where resource scarcity is a concern (e.g. water), there has been growing recognition of the usefulness of pricing as a demand management tool. Recent trends show improved utility pricing policies in terms of purely financial performance. While this was not explicitly for environmental purposes, it has encouraged more efficient resource use, which is clearly consistent with environmental objectives. Prices generally need to be further increased however to fully reflect external environmental costs.

## **3. Policy Gaps and Weaknesses**

### **A) Absence of an institutional framework for the pricing of environmental and natural resources**

Pricing policies in a range of sectors have major impacts on the environment. Deforestation, soil erosion, urban air pollution, and traffic congestion are just a few symptoms of pricing policies that inadequately reflect environmental damage costs. Evidence is that environmental and depletion costs are systematically ignored in pricing policy. Important resources such as energy, water, timber, fisheries and grasslands are being put under unprecedented levels of stress as a result of perverse price incentives.

Yet pricing remains outside the control of environmental authorities and comes under the remit the National Development and Reform Commission (NDRC). The mandate of the NDRC's Pricing Bureau is essentially to ensure that market forces effectively play out to determine prices. The chief concern of policy-makers regards the impacts of price changes on production costs, consumption and corporate profits. As such there is no effective framework for the pricing of goods that exhibit externalities at this level.

Prices can also be adjusted indirectly through the taxation system, which comes under the authority of the State Taxation Administration (STA). The STA's key and

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<sup>10</sup> In line with the requirements of the air pollution control act, 2002

overriding function, however, is to raise and collect revenues, not to adjust the pricing system. Moreover, the STA is merely an implementing agency: the Ministry of Finance (MoF) makes the final decisions on taxation, as well as on public expenditures. Similarly, SEPA is but an implementing agency for the NDRC.

The current taxation system focuses on a narrow concept of economic efficiency that excludes environmental externalities. Strictly speaking, no single tax in China's current tax system can be labelled as an "environmental tax", but several taxes may have significant environmental impacts. Among the various environmentally related taxes the natural resource taxes are the ones with the most explicit environmental dimension. However, the main purpose of these is not to promote conservation or sustainable use of natural resources, rather it is to adjust the incomes of companies and promote market competition. Moreover, the current resource taxes only cover non-renewable resources. Environmental charges are widely applied, but these take the form of *off-budget fees* collected according to environmental protection policies and regulations, many of which have not been upgraded to laws.

The low participation of environmental authorities and experts in the pricing and taxation processes is a major factor in the failure to integrate environmental externalities into pricing and taxation.

## **B) Public financing for environmental protection remains inadequate**

*Ambiguity with regard to the roles of public authorities in dealing with environmental issues results in a mismatch between responsibilities and means for environmental protection* – The fiscal and environmental regimes are weakened by split responsibilities, which lead to coordination failures and even to institutional conflicts between ministries and levels of government. The result is chronic shortage of budgetary (and human) resources to deal with many environmental problems, especially at local levels (such as financing of nature reserves, upstream wastewater treatment etc).

Coordination failures tend to be more pronounced in the management of environmental resources that span many jurisdictions. For example, with respect to the seven big trans-boundary rivers government policy makes insufficient provision for upstream-downstream coordination for integrated watershed management. As a result, there is neither the incentive nor the financial capacity to invest in pollution control or treatment<sup>11</sup> upstream.

*The low efficiency and effectiveness of fiscal expenditures on environmental protection* is a growing problem that needs to be addressed. Much of current public expenditure on environmental protection ends up having little impact, often because local governments do not have the financial resources to match central funding (this is especially true for spending on operation and maintenance) and lack the resources to manage environmental programs. Moreover, the effectiveness of big centrally

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<sup>11</sup> This situation can be rectified if a system were in place for fiscal transfers from central government to upstream locality to pay for pollution control and treatment.

formulated programs (e.g. the Sloping Land Conversion Program) is low when implemented uniformly across the country without due regard to regional differences.

To a certain extent low efficiency and effectiveness are results of unclear objectives leading to poor targeting of financial support. But a number of other factors are also at play. Plans are often not based on realistic assessments of available fiscal resources and include arbitrary investment targets (e.g. wildly off-target wastewater treatment targets). In other words planning and budget processes are poorly coordinated. In addition, there is poor public financial management and accountability, as reflected namely in erratic and ad hoc changes in spending priorities. This is made worse by the general lack of transparency in the budget approval process. Finally, there is lack of integration between environmental, social and economic objectives, as well as lack of coordination between pricing, taxation and expenditure policies.

### **C) The fiscal regime for environmental protection exacerbates regional inequalities**

The *system of fiscal transfers is inefficient and regressive* – Fiscal transfers fail to reduce disparities and to ensure a fair and efficient distribution of benefits from environmental resources. Three aspects in particular are worth noting:

- *Economic costs and benefits arising from resource exploitation and use are unfairly distributed across regions and population groups* – This is true at different spatial scales. At the regional level, developmentally-delayed but resource rich regions are not adequately compensated when their resources are extracted and transferred elsewhere in the country. The resource-rent transfers represent significant losses in development potential for these poor regions;
- *Unstable and unpredictable transfers undermine local governments' ability to deal effectively with environmental issues* – Local governments in most developmentally delayed regions of China depend on financial transfers from the centre. But these transfers are often unstable and unpredictable. This reinforces the short-termism in local government planning and spending and its focus on economic growth. Weak control and supervision of local government budgets means that central fiscal support intended for environmental purposes often get diverted to financing other emergencies or priorities;
- There is a *complex system of equalisation and special purpose transfers* from central and provincial governments that are poorly coordinated and tend to have a perverse effect, benefiting rich areas with high rates of economic activity over poor areas. As a result poor provinces often lack the financial support from central government to undertake key environmental protection functions.

*Structural inefficiencies in the taxation system reinforce distributional inequities* – In particular, there are continuing perverse subsidies to certain forms of energy, large-scale water use and pesticides use, which increase environmental externalities and are both economically and environmentally damaging and represent significant drains on the public budget. Resource taxes are currently set too low to provide real incentives for efficient use and allocation. It is the poor, invariably, who suffer most from the

environmental degradation caused by such policies, even when they were the intended beneficiaries

***The flow of private financing for environmental investments is biased in favour of relatively affluent coastal cities*** – China has known some significant successes in attracting increasing private sector investment to environmental infrastructure over the past decade, namely in the area of waste management. However, most of these investments are concentrated in relatively well-off urban centres on the Eastern coast. Private investors are unable to get a guaranteed return in poor regions mainly because of: (i) a low rate of fee collection (related to affordability constraints); (ii) rigid pricing schemes that do not allow enough scope for regional differentiation, and; (iii) mis-targeted financial support from central government.

***Inadequate procedures for public participation*** continue to be an obstacle, and reform in this area will reduce the costs and improve the effectiveness and pro-poor aspects of EFIs. The experience of Water User Associations (WUAs) provides a good example of how participation in environmental management can yield beneficial results for the poor (see box I).

**Box I: The benefits of improved public participation in pricing decisions – The case of WUAs**

Water Users Associations provide a proven institutional mechanism for reducing the cost of irrigation, improving the efficiency of water use, and improving the cost-effectiveness of irrigation practices. These effects tend to benefit the poor located in those areas. Empirical evidence shows both positive and negative experiences. But the WUAs have been effective mechanisms for operationalising volumetric pricing and for involving farmers in the pricing and management of water. In some cases the magnitude of water savings was such that the water bill for farmers was reduced, despite self-determined price increases.

#### **4. On the feasibility of EFIs in the current context**

***An enabling policy environment*** – The current climate of reform and transition provides a very good basis for implementing EFIs. In China, as in other countries, there is increasing recognition of the potentially important role that EFIs can play in addressing environmental issues in a way that is *consistent with other economic and social goals*. There is also a growing body of knowledge and practice internationally that China can draw on in designing and implementing EFIs for environmental management.

***Technical feasibility*** – Despite data limitations, it is often feasible to work out estimates of external cost that are operationally useful. Indeed the magnitude of external costs is such that we can often be confident as to the direction in which market prices should be adjusted. Even where measurement difficulties make it difficult to estimate environmental damage costs, proxy measures may be employed, such as politically determined levels of remedial or preventive expenditures.

The OECD is currently working with the Chinese government to improve the quality and reliability of environmental information: this will lower the technical barriers to implementing more sophisticated EFIs in the future.

***Administrative feasibility*** – In practice, many EFIs can be designed with low administrative costs. Indeed they can often be combined within the existing tax system. For example, excise taxes on fossil fuels are among the easiest to levy, especially if they are collected at the point of production. Most of the measures we propose in this report require very little administrative changes, as they build on existing structures.

***Social feasibility*** – Regardless of their actual impact, there is a common perception that price increases will have regressive impacts. This is not necessarily the case. It is often the better-off who benefit most from cheap environmental services and natural resources, while the poor suffer disproportionately from the environmental degradation resulting from over-exploitation and use.

EFIs can contribute to social goals by addressing the environmental problems that matter to the poor such as soil degradation and by enforcing a more equitable distribution of costs and benefits from environmental resources. They can also improve poor peoples' access to basic environmental services (such as clean water) by generating funds for infrastructure expansion and targeted programs of support (see Annex I).

Price increases do not always result in increased financial burden for users. For example, there is anecdotal evidence from Anhui province that in spite of water price increases the water bill for some Water User Associations has actually decreased because of water saving, and collection rates have improved reflecting increased willingness to pay. Eliminating subsidies to pesticides/ fertilisers has the potential to reduce over-use without affecting costs seriously, and can contribute in the long-term to higher soil productivity. Where price increases do give rise to affordability problems however, it is important to introduce mechanisms to address the special needs of poor households.

***Political feasibility*** – There are bound to be losers as well as winners from any policy change. International experience shows that lack of political will and resistance from interest groups may often be the most significant obstacles to implementing EFIs. There is currently strong leadership and political will to tackle environmental problems in China. What is needed is careful management of the policy process for introducing EFIs. Proposed changes will stand a greater chance of success if they build on a strong understanding of relevant institutional and political economy aspects and if stakeholders are involved in the design, implementation and monitoring processes. Gradualism in implementation and advance warning are key factors for political feasibility, since affected parties need to be given the time to adapt to proposed changes. The experience of the UK illustrates good practice in involving stakeholders in the policy process (see Annex I).

***A supportive legal and regulatory framework*** – A strong legal and regulatory framework is in place to support the broader application of EFIs in environmental management. Many recently enacted or promulgated special laws and regulations

relating to environmental protection and natural resource management explicitly mention the use of economic instruments to achieve stated goals (e.g. Water Act, the EIA law, and the Cleaner Production Act). The legal and regulatory framework for pricing is also increasingly comprehensive<sup>12</sup>.

### III) Putting EFIs in to practice

#### 1. Guiding principles

**Consistency** with broader reform objectives – EFIs need to be consistent with and properly coordinated with other economic and sectoral reforms. The effectiveness of EFIs depends not only on their content and design but also on how they are coordinated with other tax reforms.

**Gradualism** – EFIs must be introduced in tandem with the overall pace of change, with a consistent policy approach and with appropriate measures to support the necessary changes and cushion the potential economic and distributional impacts. The context of transition requires that environmental taxes for example be implemented gradually, especially when the tax rates are supposed to increase significantly. One proper method is to announce the introduction of a tax or price change long before it is actually introduced, to introduce it at a level well below the desired final level, and to increase it gradually. The adjustment may take a period of 3-5 years, however, the direction of reform should be clear and the adjustment should be carried out firmly. The role of new taxes should only be considered after existing taxes/ charges have been reformed and rationalised, and environmentally harmful subsidies eliminated.

**Taking the fiscal system as a whole** – Decision-making for environmental pricing, taxation and expenditure lies in separate administrative bodies and is poorly coordinated. As a result opportunities for designing mutually enforcing EFIs to achieve a specific policy objective at lower cost are missed. Existing studies have also tended to treat taxation and pricing issues as separate, and to look at the revenue and expenditure sides of the budget in isolation from each other. In reality taxation and pricing issues are fundamentally intertwined and revenue and expenditure policies are two sides of the same fiscal coin.

**Additionality** – Environmental expenditures should complement rather than substitute for private flows and, as far as possible, aim to mobilise other resources in synergistic fashion. Where financial institutions fail in mobilising and directing savings – and given that market signals are imperfect – the state has a crucial role to play in allocating investment funds. Public funds should not be used for environmental projects that would have taken place in the absence of public funding (i.e. projects with high risk-adjusted rates of return). Furthermore, fiscal expenditures have a crucial role to play in anti poverty programs.

**Balancing interests and objectives** – The ability to balance stakeholders' interests is crucial to success. Identifying winners and losers is a crucial first step. Many proposed environmental pricing and taxation measures have been defeated in the past

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<sup>12</sup> E.g. pricing law (1998); public hearing on pricing measures (2001); 'tentative measure to supervise price of important commodities and services' (2003); 'anti-monopoly' provision (2003)

because of conflicting interests among stakeholders, and resistance from adversely affected groups. An instrument may have several possible objectives and it is important therefore to start by building consensus among stakeholders as to what the main objective of the instrument is. This may require some awareness-raising to inform stakeholders about the different impacts and aspects of the instrument. Broad-based political support can be built by bringing winners in to be advocates for change and by adequately compensating losers.

***Environmental effectiveness*** – EFIs should enhance the government’s capacity for comprehensive environmental management by harnessing market forces in support of environmental improvement. International experience shows that EFIs can significantly enhance the effectiveness of the environmental protection regime by providing least-cost solutions to pollution control and abatement; improving compliance rates; and by raising funds for environmental investments. Looking more broadly, EFIs should encourage the adoption of new sustainable development pathways, e.g. by promoting the development of the circular economy, and the establishment of a conservation-minded society.

***Equity and fairness*** – Pricing schemes and fiscal transfers should ensure that costs and benefits from environmental services are equitably shared between regions, jurisdictions, population groups, and generations. In general polluter pays and user pays principles should be observed, but it is equally important to address affordability issues where they may arise. This suggests the need for targeted support to vulnerable groups, where price increases impose an unreasonable burden on poor people. Applying the **ability-to-pay principle** according to which taxes/ fees are based on the income or ability of people to pay is one way of addressing distributional issues. Proportional and progressive taxes, as well as two-part tariff systems are examples how this principle may be applied in practice.

***Sequencing*** – The usual recommendation would be to start with areas where win-win opportunities are largest. Usually, this means starting with removal of perverse subsidies (e.g. in the water and energy sectors). Ideally the sequence should be: (i) remove/ reform environmentally harmful subsidies; (ii) reform and rationalise existing environmental taxes/charges; (iii) assess the role of new ones. Priority should be given to amending government interventions in the market that are economically and environmentally perverse, and introducing interventions (such as pollution taxes) when market forces are inadequate. These actions should be accompanied by efforts to address underlying causes of natural resource degradation and to improve understanding of what affects the environment and how.

***Pragmatism: taking account of Second best solutions*** – Adoption of “second best” solutions will frequently be required, particularly where administrative costs associated with ‘ideal’ instruments are prohibitive or data requirements unrealistic. Furthermore, introduction of price incentives in situations where prices in general do not reflect real resource costs, are likely to have perverse results, and replacement of regulatory mechanisms by price incentives will often have to take place gradually. Considerations of social equity reinforce this conclusion. Economic efficiency and growth objectives must be modified to consider distributional issues. As far as possible EFIs should build on existing environmental fiscal policies and measures.

***Common but differentiated responsibility*** – Although in principle polluter-pays principle should be applied, there are circumstances where a role for central financing is justified, namely in the following cases: (i) trans-jurisdictional problems (e.g. river basin management); (ii) in the case where polluters are poor, or low-income levels raise affordability problems in terms of payment for environmental services, and; (iii) where there are clear environmental benefits at the national and international levels.

***Complementarity*** – There typically exists a variety of instruments for achieving any given policy goal. EFIs are not always the optimal instrument, and often perform best when included in a wider instrument mix. EFIs should not replace other instruments that are more effective in achieving a desired goal. Nor should EFIs permanently substitute for weak environmental policies. This point is further elaborated below.

## **2. Enabling conditions / supportive measures**

EFIs bear the greatest chance of success when combined with other supportive policy measures. Supportive measures may be particularly important in the context of transition, when many markets may still be missing, incomplete or imperfect. In these cases, interventions are required to build the framework conditions for markets to perform. These supportive measures are almost always desirable in their own right, and when implemented alongside EFIs may be mutually supporting.

***Education, information, training, access to appropriate technologies, credit and advice*** – Where the aim of an EFI is to encourage substitution towards more environmentally-friendly products/ practices, there is a need to ensure that affected groups are well-informed, educated on alternatives, if not substitution will not take place or be as effective<sup>13</sup>. These measures are also crucial to ensure that the poor have access to markets, information, and appropriate technology so that they are able to make the best use of their resources and participate advantageously in market exchanges (see box II).

### **Box II: On the importance of enabling conditions – the case of fertilizers and pesticides**

Agricultural chemicals have been widely applied in China's agricultural practice. Pesticides and fertilisers are heavily subsidised, and the efficiency of their use is extremely low: it has been estimated that China wastes as much fertilisers as the whole of the United States uses. The case for increasing the price of agricultural chemicals to provide incentives to farmers to use chemical inputs more efficiently has been argued for a long time. However, evidence shows that farmers' demand for agricultural chemical inputs is relatively unresponsive to price changes. Additionally, the price signal transferred from farmers to final consumers is very weak, so that farmers would ultimately bear a big part of the burden of increased prices.

Our research as well as international experience suggests that in the absence of supportive programs, fertilizer and pesticide taxes will be generally ineffective for

<sup>13</sup> The NPSP case studies provide an interesting case in point. Some researches concluded that there should be no significant yield reduction when fertilizer use reduced by 30%, giving a low efficiency of fertilizer use in China (e.g. Norse, 2003). This observation is very different from farmers' experience. The big gap between scientific research and farmers' experience indicates the need for a better extension and communication.

controlling non-point agricultural pollution, and also has adverse distributional effects, since low income and crop-dependent households are disproportionately affected by higher prices for these agricultural inputs. Farmers make decisions on fertilizer use largely based on their own estimations. In order for any pricing measure to achieve the desired result of encouraging more efficient use, better education and information is crucial. Only very few farmers have access to training on fertilizer and pesticide application. There is large scope for education to play in improving fertilizer use. There is a need also for better technical advice and extension services (these need to be site-specific).

Finally, an effective eco-labeling system, an improved monitoring system and stricter enforcement are needed. Studies have shown that consumers are willing to pay for high quality agriculture products, and that labelling is a trusted means of conveying information on the quality of products.

***Clarify resource ownership and rights structure*** – Specification of property rights is a precondition for the application of economic instruments in environmental management. Indeed, in the absence of property rights, market signals may be wholly ineffective. It is also important in itself as it reduces uncertainty over access to, and development of resources. We found it especially important to clarify rights over land, as it is important for farmers to ensure that those that lose their land are fairly compensated. It also lays the ground for creation of markets for environmental goods and services to emerge.

***Improve the quality of and public access to environmental information*** – The need for a comprehensive **environmental information management system** to ensure authoritative release of environmental information been recognised, and the OECD is currently working with the GoC on this. We suggest that this would work best if it involved the creation of a single inter-ministerial office to collate, compile and disclose environmental data. In addition to being a repository of environmental information, this office should also be responsible for: (i) monitoring the quality of environmental information collated from various agencies (quality control), and; (ii) ensuring the right information reaches the right agencies. It should also be required to make environmental information accessible to the public.

***Continue and accelerate market reforms to increase the autonomy of enterprises and their responsibility for their own profits and losses*** – This is required not only for increasing competitiveness but also for greater responsiveness to environmental pricing and taxation. As long as enterprises face soft budget constraints (i.e. are supported by state subsidies), the desirable effects of EFIs will be dampened.

***Enhance public participation in the policy process*** (from planning and policy development to monitoring). This is crucial to the success of centrally formulated policies. Experience, in China and abroad, show that policies will be difficult to implement at the local level when policy design and implementation ignores local ecological characteristics and incentive structures. Community participation in design, implementation and monitoring may result in reduced costs and increase effectiveness and will crucially contribute to policy sustainability. The experience with Water User Associations and the Sloping Land Conversion Program (SLCP) are cases in point.

NGOs may have a particularly important role in this. Also, we recommend that measures are taken to improve the existing public hearing process.

### **3. General recommendations**

#### **A) Establish a policy framework for EFIs that sits firmly within the public financial system and involves relevant sectoral agencies.**

##### **(1) The first major task is to clarify existing government functions with regard to EFIs, namely:**

- The State Council's role in the valuation and prioritization of environmental objectives
- NDRC's functions pertinent to pricing for environment-related public goods;
- MOF's functions pertinent to decision-making for environmental fiscal expenditure;
- MOF and STA's functions pertinent to making environment-related taxation policy, and;
- SEPA and other sectors' functions pertinent to participating in making, implementing and monitoring EFIs policies.

The next step is to establish decision-making coordination and evaluation mechanisms, and enhance decision-making competence.

##### **(2) Establish coordination and evaluation mechanisms for EFIs**

Consistency between pricing, taxation and expenditure instruments is generally needed to ensure the success of any given EFI measure. There are bound to be conflicts of interests between ministries, so there is a need for formal mechanisms to ensure dialogue and cooperation. We recommend that a central Lead Group on EFIs be set up under the charge of MOF, with related sectors participating in it. The Lead Group would be responsible for:

- coordinating design and implementation of environmental expenditure, taxation and pricing policies, and;
- determining the feasibility of implementing EFIs.

##### **(3) Enhance decision-making competence with regard to EFIs**

Although a number of EFIs have been in use for a long time in China, as an area of expertise it is relatively new and independent analytical and advisory capacity will be required to inform decision-making in this field. Therefore we recommend that an independent group of experts be set up, to provide related sectors with decision-making support. Specific responsibilities should include:

- Technical support, mainly for NDRC, MOF and STA, in conducting institutional and economic feasibility studies and environmental and social impact assessments of proposed environmental pricing schemes,

environmental investment projects, environmental taxation reform and adjustment schemes;

- Evaluation of EFIs' implementation and of the effectiveness of environmental expenditures.

Concurrently *environmental authorities need to be empowered to participate in economic and sectoral decision-making processes from an early stage*. In particular, SEPA should build the capacity to engage in pricing, taxation and expenditure policy processes. In order to participate meaningfully in these policy processes, environmental authorities need to build up a strong scientific base. They need to be in command of reliable data and information (e.g. on emissions, damage costs) and of the relevant expertise to interpret and use this data. It will be crucial therefore to build up capacity for economic analysis and enhance monitoring capabilities. SEPA should also be involved more systemically with the public hearings process.

## **B) Ensure the proper establishment and effective functioning of the Environmental Fiscal Expenditure Account (EFEA)**

The establishment of an Environmental Fiscal Expenditure Account (EFEA) is under preparation. This should provide a stable framework for public spending on environmental protection and construction at the national level. To ensure that it fulfils this function effectively, the following operational rules and principles should be observed.

**(1) The EFEA should guarantee adequate and predictable budget allocations for central agencies with a mandate for environmental and natural resources protection.** The first step is to consolidate all environmentally related expenditure items – currently administered under different arrangements in various agencies – under a unified budget administration system. Regular public consumption on environmental protection should be aimed at enhancing the capacity of environmental administration. The basic rules of sound Public Financial Management and Accounting should be observed.

**(2) Environmental financing under the EFEA should focus on addressing environmental problems that have a clear national dimension or where the public welfare costs or benefits span several jurisdictions.** These would include:

- Environmental education programmes including scientific environmental research
- Cross-jurisdictional environment administration projects
- Investment in monitoring of trans-jurisdictional air and water pollution
- Key ecosystem and natural heritage protection programmes
- Implementation of international environment conventions
- Clean up of pollutants left over by history
- Treatment of dangerous wastes
- Emergency handling of environmental hazards and disasters

- (3) Fiscal transfer payments for environmental protection should be determined in accordance with the principles of distributional justice and ‘common but differentiated responsibility’.** Although in principle the polluter-pays principle should be applied, there are circumstances where fiscal support from the centre is justified, namely where polluters are too poor to invest in effective treatment and control, or low-income levels raise affordability problems in terms of payment for environmental services. In the short-run therefore, we recommend that **transfer payments give priority to low-income or less developed areas**<sup>14</sup>, and those geographic areas with great environmental or ecological significance, such as middle and upper reaches of a river, and ecologically vulnerable areas.
- (4) Environmental expenditures should be coordinated with public spending programs on poverty alleviation in order to exploit win-win opportunities** – Taking an integrated approach to public interventions on environment and poverty will increase the effectiveness and efficiency of public spending on these two goals, particularly where environment-poverty interactions are strong. In addition, it will be important to balance the distribution of costs and benefits among the various interest groups, regions and generations. Finally, large public expenditure programmes need to be systematically scrutinised for their impacts on the environment and on the poor.

### **C) Develop a systematic and consistent approach to environmental pricing and taxation reform.**

The chief purpose of environmental pricing and taxation policies should be to compensate for the failure of market forces to adequately reflect environmental costs in prices. But this cannot and should not be accomplished overnight. Environmental tax reform for example follows a logical sequence from adjustment of tax items and tax rates, to establishment of new tax items, and finally to adjustment of the taxation structure as a whole. The usual recommendation would be to start with areas where win-win opportunities are largest and to be opportunistic, i.e. by building upon existing structures and synergies with ongoing reforms. In light of these considerations we recommend the following:

- (1) Greening the taxation system** – the situation is not mature for introducing new environmental taxes. However opportunities currently exist for integrating environmental considerations into mainstream tax reforms, particularly where such considerations strengthen the achievement of reform objectives. This Task Force identifies concrete opportunities in fuel tax reform, water resource tax and product tax adjustments. The suggested interventions imply very little administrative changes since they build on existing structure. These are elaborated on below.

More generally SEPA should lend political and technical support to policies that involve increasing prices of subsidised natural resources. In the longer term, environmental considerations should be systematically built in to reform

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<sup>14</sup> This includes both areas with low government income, and areas where the population is income-poor.

of environmentally-related taxes or taxes with large potential environmental impacts.

- (2) **Strengthening the scientific basis for environmental valuation** – Regulatory agencies must develop the capacity to evaluate environmental damage costs and ensure these costs are passed on to end users. This hinges on the availability of environmental data and there is a strong requirement for the development of a comprehensive environmental information management system to ensure authoritative release of environmental information.
- (3) **Public utility pricing should be based on long run marginal opportunity costs subject to technical and affordability constraints** – Where low income levels mean that affordability constraints do not allow full-cost recovery then *central fiscal support may be needed to adjust pricing schemes*. For example, by lowering construction costs central grant financing should reflect in lower prices for end users. Reconciling objectives of full cost recovery and affordability may thus require the coordinated use of expenditure and pricing instruments, implying the need for cooperation between different public agencies.
- (4) **Where some form of subsidy is justified, it must be time-bound and target-oriented** – By definition subsidies distort investment decisions. Where market forces militate against adoption of environmentally friendly technologies, and where the existing system fails to allocate resources efficiently or equitably some form of subsidisation may be required. Subsidies can also reinforce pro-poor aspects of EFIs. However, in all cases the rationale for subsidisation should be re-evaluated regularly to ensure that the subsidies do not continue after they are no longer needed.

## 4. Sector-specific recommendations

Deteriorating water quality in Northern China's rivers, air pollution and acid rain have become urgent policy concerns. Indeed, Premier Wen Jiabao in his 2005 report on the work of the Government explicitly pledged that efforts to control air and water pollution would be prioritised and boosted. Our research suggests that EFIs can achieve significant 'quick-wins' and sustained impact in these two areas.

### 4.1 Urban Waste Water Management

According to the "Report on the State of the Environment in China 1999-2004", water quality in China's Northern Rivers has been deteriorating at an alarming rate. The rate percentage of class IV-V water (i.e. severely polluted) increased from 28.6% in 2000 to 69.2% in the Yellow River, while over the same period it rose from 72% to 81.4% in the Huai and 58.5% to 78.5% in the Hai river.

In addressing deteriorating water quality in Northern Rivers, we recommend that the immediate focus of interventions should be on increasing the rate of urban wastewater treatment and that the emphasis be on accelerating infrastructure investments in middle and upstream locations. Ultimately, wastewater pricing and investments in sewage treatment and collection should be organised on a river basin level. Finally, we propose that water prices should be gradually increased by means of the introduction of a water resource tax. In the longer-term, rationalisation of the water pricing system will require significant institutional changes to the decisions-making process for water pricing.

### *Analysis*

Urban wastewater is a significant and growing contributor to the trend of deteriorating water quality in China's Northern Rivers. Since 1999, the volume of urban water effluent has exceeded that of industrial ones, reflecting a drastic increase in urban water consumption which is driven by artificially low prices and rapid urbanisation. In some upstream cities, the rate of urban sewage treatment is lower than 20%. Without adequate facilities to treat their sewage, many cities either release this waste untreated into nearby rivers or dump it onto surrounding farmlands. The shortage of clean water has become a serious issue in many localities, posing a threat to public health and living standards.

The trend of worsening water quality has occurred even as government increased its investments in treatment facilities. A number of factors help explain this. Firstly, investments in sewage treatment and collection are currently determined at the municipal level and come under the remit of the construction authorities. Secondly, there is a strong emphasis on the role of the market in mobilising additional financing. As a result investments have been concentrated in the big and relatively affluent downstream cities, while most of the pollution occurs in the poor middle and upper reaches where the sewage treatment rate remains very low. In sum, there is a discrepancy in the geographic distribution of investments. Finally, economic forces and the trend towards privatisation at the national level result in a bias in favour of wastewater treatment plants, whereas the greatest need is for investment in sewerage infrastructure. The establishment of separate utilities for water and for sanitation, and the division of responsibilities between them not provided the best incentive framework for financing these services.

Urban sewage treatment has the characteristic of a public good since it benefits *all* water users in the basin. It therefore makes sense for central government to intervene in order to ensure a more rational distribution of treatment capacity throughout the basin as a whole.

The systematic under-pricing of urban domestic water has been a significant factor behind the drastic increase in urban water consumption, resulting in increasing volumes of urban waste water. As a matter of routine, municipal authorities continue to subsidise water prices out of general revenues. Even in Beijing where the price of water has been steadily increased over the past few years, the current price of water is estimated to cover only about half of the full supply costs, with the difference being met by the Beijing government.

## ***Recommendations***

- (1) Reinforce the supervision of municipal pollution sources.** Weak monitoring and supervision capacity is a key factor behind low treatment rates. There is an urgent need to step up investments to build up local EPBs' supervising and executing capacity. Central government has an important role to play in building up this capacity, and related investments should be prioritised. The trend towards privatisation of sewage collection and treatment operations will increase the effectiveness of pollution charges. It should be noted however that where facilities are still under public ownership, pollution charges will be redundant and only a regulatory system would work.
- (2) Accelerate fiscal transfer payments to support investments in sewage treatment and collection in the upper and middle reaches.**

Under the current system investments in sewage treatment and collection are determined at the municipal level. As a result investments are skewed towards big, rich cities that are typically located downstream, while most of the pollution occurs in the poor middle and upper reaches. We recommend that fiscal transfers be channelled to these middle and upstream locations to increase the rate of urban wastewater treatment. These transfers should aim to finance capital investments and wastewater pipeline networks, while sludge disposal facilities should be financed locally. By bringing down the cost of operating sewage treatment plants, these measures should help mobilise private financing. A sub-account should be set up under the EFEA for this purpose.

- (3) Wastewater pricing and investments in sewage treatment and collection should be organised on a river basin level,** rather than at the level of municipalities.
  - ***Wastewater management should be incorporated in to regional water management plans*** – Inadequate cooperation between concerned agencies means that in practice water resources are often not put to their most productive use. Regional planning is required to integrate industrial, urban and irrigation water management to allocate to competing uses of water resources in an efficient manner. Effective representation of institutions with responsibilities for waste water (e.g. SEPA, NDRC, EPBs, municipalities, MoC) in regional water planning agencies is critical.
  - ***Divergence in wastewater treatment fees between cities should be based solely on differentials in sewage treatment and collection costs*** – The wastewater treatment fee in many of the relatively affluent Eastern cities is currently set above this level. The presence of excess profits in Eastern cities hinders the flow of private investments to Western areas, and also creates excess burden on the local population. We recommend that a group of experts be set up to monitor and assess the situation with regard to regional divergence in sewage treatment and collection costs across the region.

(4) **Rationalise water pricing** – Water consumption and its disposal must be handled together, since the volume of water consumed is an important determinant of river-basin water quality. The objective ultimately should be to price water in line with full economic, environmental and social costs.

- ***Water prices should be gradually adjusted upward by means of a water resource tax*** – Municipal water supply costs continue to be heavily subsidized by local governments out of general revenues. The objective ultimately should be to price water in line with the long run marginal costs of supply. In practice such a policy will result in greatly differing prices for water in different parts of the country. Since long run marginal costs exceed average financial costs, financial surpluses will be generated which can be used to expand capacity. The proposed means of achieving this adjustment is the introduction of a **water resource tax**.
  - This tax should be introduced at a relatively low rate, and increased gradually over a period of 3-5 years at pre-announced rates.
  - Revenues from this tax should be channelled in to the general budget (reflecting national ownership of the resource), and shared between local and central government in line with the revenue-sharing rule that applies to natural resource taxes.
  - Over time this tax should fully replace the current water resource fee, and part of the revenues from it should be ring-fenced for spending by Water Resource Bureaus on water resource protection.
- ***A Two-Step Tariff (TST) structure should be implemented for urban water to ease the burden of higher water prices on poor households*** – Pricing based upon real costs of supply may give rise to affordability problems for poorer sections of the population. A Two-Step Tariff (TST) structure can transfer the burden of water tariffs from poor to rich households. And if a long-run marginal cost pricing strategy is followed, there should be in most cases ample financial surpluses to compensate for the lower rate needed to meet basic household needs while still providing sufficient funds for expansion of the distribution system to the (generally poorer) communities currently without access to clean water.
- ***Optimise institutional arrangements for water pricing*** – Currently the end price of water is made up of three components – the water resource fee, water supply fee, and wastewater treatment fee – which are determined separately by different agencies and are poorly coordinated. Ultimately the decision-making with regard to the price of water should be consolidated under a single agency. Although the decision over water prices should remain at the local level, local prices should be approved by authorities at a higher level. The implication is that the capacity of the NDRC Pricing Bureau to supervise and approve pricing schemes should be boosted.

## 4.2 Reducing Sulphur emissions

Air pollution is, by some assessments, the biggest killer in China. This pollution is produced by a variety of sources, including a quickly growing transportation sector, residential heating, and light industry. Much of it is generated by power plants and

heavy industry, often located in urban areas. In order to tackle air pollution and acid rain problems, we suggest that the immediate focus for intervention should be on increasing the rate of desulphurisation treatment in coal-burning power plants. Even with improvements in the rate of desulphurisation, electricity consumption will continue to be a major contributor to sulphur emissions in China, hence rationalising electricity pricing will continue to be an important element of any pollution control strategy. In the longer term, we suggest that fuel and product taxes be adjusted to incorporate environmental damage costs.

### *Analysis*

The GoC is committed to tackling pollution caused by SO<sub>2</sub> emissions. But the two main policy measures currently in place to deal with this are not proving effective. First, there is weak compliance with the requirement for all new electricity plants to install desulphurisation facilities. Even where treatment facilities are installed they are often not operated. Secondly, the SO<sub>2</sub> pollution levy / emissions cap is impossible to enforce effectively given that most power plants do not have online monitoring systems. Therefore fees are not collected. The main problem here is weak monitoring leading to weak enforcement. The economic benefits of expanding the desulphurisation pricing policies are illustrated in box III below.

#### **Box III: The economic benefits of desulphurization electricity pricing**

In 2004, the total desulphurization capacity of the power plants was 30 million kw in China. Based on an average operation time of 5500 hours per year, and assuming the desulphurization electricity price of 0.015 RMB per kwh covers the cost of the construction and operation of the desulphurization facilities, the **cost of desulphurization would reach 2.475 billion RMB per year**. The capacity for SO<sub>2</sub> reduction of all the desulphurization facilities combined is 1.8 million tons per year. If these desulphurization facilities can keep running with full load, they will generate the following **benefits**:

- 1) 4.37 billion RMB in revenues can be raised through emissions permit trading
- 2) A reduction of 36 billion RMB in environmental damage costs
- 3) A reduction of 1.08 billion RMB in the pollution levy on the power industry (at the current rate of 0.6 RMB / kg SO<sub>2</sub>)
- 4) Desulphurization facilities worth 8-13.4 billion RMB could be utilized (according to the construction cost of 300-500 RMB / kw)

It is clear therefore from the above that the economic benefits of installing desulphurization treatment facilities in power plants far outweigh the costs.

So far, attempts at national damage assessment have not been able to recommend specific policies, due to their uncertain and aggregate nature. What few studies do, moreover, is identify national priorities, evaluating the best use of public resources for tackling pollution control across the national economy. To set national pollution control priorities, the GoC has had to rely on simplified analyses and rules-of-thumb, rather than comprehensive assessments that permit systematic cost-benefit analysis.

Our work has sought to bridge this gap. Health damage estimates are directly linked to economic activity and energy use on a sector basis, allowing us to identify the sources of damage and allocate responsibility. This helps to prioritise pollution sources for emphasis in national energy and emission control policies, and to understand their effects throughout the macro-economy. An integrated model is used to assess health and economic effects of various EFIs for pollution control.

A complete assessment of the adverse effects of air pollution require us to look beyond energy use or emissions per se and focus on damages. We have focused our attention on the electric power sector given that this sector is the largest source of damages (26%).

The benefits of pollution control in China likely far exceed the costs, if market instruments are used. Theoretically a direct tax on emissions would be the most efficient policy. But high data and administrative demands make this instrument infeasible. It is suggested that damage-weighted taxes on fuels and economic output are two pollution control policies that are feasible in the medium term and can have a broad impact.

However in the current context it is not realistic to start with introducing these taxes. As with urban wastewater management we suggest a sequenced approach which starts with internalisation of desulphurisation treatment cost in to electricity prices, and ends with taxes which capture external damage costs.

### ***Recommendations***

- (1) Increasing desulphurisation treatment by extending the desulphurisation pricing scheme to all coal-burning power plants** – The cost of desulphurisation has been declining markedly, so that the fixed 0.015 RMB per kwh charge that new power plants can pass on to the grid can often cover the cost of construction, depreciation and operation of the desulphurisation facility. We recommend that this policy be extended to all regions and all plants, old and new. Eligibility for charging the desulphurisation fee to the grid should be made conditional on actual operation of the facility. A corollary of this is that monitoring capacity for desulphurisation must be enhanced. The improvement in monitoring will also be helpful to other environmental policies such as discharge levy.
- (2) The cost of desulphurisation treatment should gradually be incorporated in to the end price faced by electricity consumers.** Currently, the entire cost burden is borne by the grid. While the grid can absorb the existing burden, within 10 years it is estimated that the cost burden on the network will rise to approximately 27 billion RMB. Considering that the cost burden on the grid will significantly increase it is important to consider how this burden will be passed on to consumers. In line with the precedent set by the Renewable Energy Law with respect to the pricing implications of renewable energy, we suggest that the cost of desulphurisation be added to the price of electricity generated by all means and shared by all electricity users. This should encourage electricity savings.

- (3) **A time limit should be set for the promulgation of the desulphurisation electricity pricing scheme in order to encourage alternative technologies.** Subsidies always bias investment decisions. Over time this may become less justified as relative prices change and new technologies emerge – there should therefore be a stated time limit for a gradual phasing out of this subsidy. After a high level of desulphurisation is achieved, investment choices related to SO<sub>2</sub> reduction can be determined competitively, so that least cost means of achieving SO<sub>2</sub> reduction targets can be achieved.
- (4) **Tax relief measures should be applied to encourage comprehensive use of desulphurisation by-products** (e.g. gypsum). The by-products from desulphurisation can be used as inputs in other productive processes: favourable tax treatment should be introduced to encourage the establishment of a market for desulphurisation by-products, and to enhance comprehensive use of desulphurisation by-products.
- (5) In the longer run, **damaged-based product taxes and damage-weighted fuel taxes should be implemented** to reflect the external costs of air pollution. Our analyses show that based on environmental damage costs of sulphur emissions these taxes could generate substantial new revenues that could be used to reduce other, distortionary taxes. In addition to considerable health cost savings, this tax rationalisation over the long-run could produce higher retained earnings and investment, leading to higher capital stock and greater productive capacity for the whole economy.

Our analyses and recommendations have focused on SO<sub>2</sub> emissions because of the pressing need to deal with severe acid rain problems, and because the administrative and technological conditions are currently in place for EFIs to be effective in controlling this particular type of emission. We recommend however that a comprehensive pollution reduction strategy should also include plans to deal with other emissions, notably NO<sub>x</sub>, CO<sub>2</sub> and POPs. Emissions of local air pollution, and global greenhouse gases (GHGs) in particular CO<sub>2</sub> are closely related and we recommend that they ideally should be studied and addressed jointly. Ultimately power plants should be required to install facilities to deal with all these emissions. Following the logic outlined above, associated treatment costs should be factored into the final price of electricity, while damage costs should be reflected in the tax system.

## CONCLUSION

There is an historic opportunity in the current context of fiscal reform and economic transition for making great strides in setting a comprehensive framework for addressing environmental problems through the public financial system. Consistent with recommendations previously made by the CCICED to the government of China, it is proposed that the long term objective should be to ensure that as far as possible the real economic and social costs of pollution and environmental degradation should be reflected in the prices charged for the use of environmental and natural resources. There is also an urgent need to rectify structural imbalances in the allocation of fiscal resources to address a range of environmental concerns.

The transition to a situation in which environmental costs are fully reflected in national, provincial, and local fiscal systems will have to be gradual, in particular to ensure that such reforms are not detrimental to the wellbeing of the poorest elements of society. In the initial phases of this transition central fiscal support may be required to: (i) promote the development of markets for environmental services; (ii) rectify regional imbalances in the allocation of fiscal resources for environmental protection, and; (iii) address distributional concerns.

Studies conducted by this Task Force provide strong evidence that in general the poor tend to suffer most from environmental degradation, while at the same time are often required to bear more than their fair share of the cost of remedial measures. EFIs can contribute to poverty alleviation by generating funds for social programs and by dealing with environmental problems that affect the poor.

The findings reported here apply not only to the specific issues addressed in this summary, which are directly relevant to the urban environment but are of more general relevance to the way in which a wide range of environmental and natural resource issues should be handled.

## **ANNEX I: Lessons from International Experience with Environmental Fiscal Instruments**

EFIs have been widely applied, in developed and developing countries alike. The motivations for introducing EFIs and their impacts and benefits have been varied, but some important generic lessons may be learned nonetheless from the vast and growing body of knowledge and experience regarding EFIs. These are summarised below.

### *Economic and social benefits*

EFIs can contribute to a **sound business environment** by providing a better framework of market incentives. Unlike taxes that discourage economically beneficial activities, such as work and savings, environmental taxes and charges can discourage activities that generate social ‘bads’ such as pollution and waste. Moreover, tax shifting can lead to reduced labour costs, thereby stimulating employment. In Germany for example, the job increase attributed to this type of tax shifting following the implementation of the ‘eco-tax’ was estimated to be at 250,000 by 2003.

EFIs can also have a positive direct effect on the **productivity and competitiveness** of firms. In addition to reduced labour costs that may result from tax shifting EFIs provide strong incentives for technological upgrading and adoption of more efficient production techniques and technologies, making firms more competitive in international markets. In the case of Germany, parts of industry have become technologically international front-runners due to well-designed EFIs.

Growing pollution poses mounting problems for **public health**. In virtually all countries studies identify health problems linked to environmental contaminants. EFIs have been shown to contribute to improved public health. Thailand provides a good illustration: only two years after a differentiated fuel tax was introduced to encourage a switch from dirty to clean fuels, health cost savings attributed to the tax were estimated at an annual value of approximately US\$2bn, or US\$270 per capita in 1996 prices.

In economies which are highly natural resource dependent EFIs have an important role to play in **setting the conditions for sustained economic growth**. EFIs can be designed to increase the capture of natural resource rents that are otherwise dissipated or transferred to private interests (often abroad). The case of Namibia’s fisheries illustrates well how EFIs can help a country benefit more from its resource wealth. Prior to Namibian independence in 1990 access to its seas was largely uncontrolled and coastal waters were massively over-fished (primarily by European fleets). In 1991 however, the Namibian government introduced a Marine Resources Fund levy<sup>15</sup>. As a direct result the sector is now more than 90% Namibian owned and contributed about \$220 million to GDP in 2000.

### *Fiscal benefits*

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<sup>15</sup> imposed per ton of landed catch

EFIs may have a strong appeal from the fiscal point of view because it can contribute to general fiscal reform objectives and may raise more revenue than is often realised. EFRs offer a range of potential fiscal benefits, including revenue mobilisation, fiscal discipline, increased transparency and accountability in the public budget, allocative efficiency and minimisation of tax-induced distortions in the economy.

EFIs can substantially **boost public revenues** by making greater use of tax sources – such as taxes on forestry and fishery harvesting – as well as by reducing the drain on government budgets caused by existing environmentally harmful subsidies – such as energy subsidies. In Cameroon for example government revenues from forestry rose from about 3% of tax collections in 1996 to an estimated 25% of total taxes in 2000-1 (IMF Staff report, 2000; Brunner and Ekoko, 2000). In 1999 Mauritania doubled the revenue it earned from its fisheries to about 30% of total tax revenues.

Even more fiscal resources can be freed up merely **removing or reforming perverse subsidies**. In Indonesia removal of the pesticide subsidy saved the government over \$100 million a year (de Moor and Calamai, 2002). Fiscal resources are further mobilised through improved efficiency of environmental expenditures.

EFIs are often consistent with traditional tax policy prescriptions. Indeed there are numerous cases where environmental resource concerns reinforce **standard tax policy prescriptions**. For instance increasing revenue from environmental and natural resource taxes is in line with shifting from trade taxes to domestic taxes, and in line with WTO requirements. Finally, EFIs can also contribute to a more stable revenue stream: having some consumption-based taxes (e.g. taxes, fees, or charges on use of water, energy, and other primary resources e.g., minerals) in the revenue mix helps to avoid revenue instability.

### *Strengthening the environmental protection regime*

The experience of Eastern European countries and countries of the former Soviet Union illustrates two important points. Firstly, that economies that rely excessively on command and control mechanisms fail spectacularly to address environmental risks and problems. Secondly, that economies with an excessively free and unregulated market fall prey to myopia and may fail abysmally in both achieving economic efficiency and encouraging sustainable use of environmental resources. EFIs provide a means of addressing both types of environmental failures.

The cost-effectiveness of EFIs in achieving some environmental objectives has been widely documented<sup>16</sup>. It is important to note however that while there are many circumstances where EFIs will perform better than traditional instruments, these should not be thought of as a panacea. EFIs should be seen as important *complements* to the existing environmental protection regime, the main point being to prop up and strengthen the existing regime, not to replace it. The environmental effectiveness of EFIs will often require support from regulatory mechanisms. For example, price changes in forestry taxes will need to be supported by regulations about how timber harvesting is conducted and where it is allowed. This suggests that *EFIs cannot be*

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<sup>16</sup> Provide REFERENCES

*examined in isolation – but must be part of a coherent package of different measures to promote improved environmental management.*

EFIs can also promote environmental objectives by mobilising financial resources for environmental management – which is particularly important in countries where this is under funded. In many Central and Eastern European countries for example, where environment funds (EFs) were set up as explicit mechanisms to mobilize funds towards environmental clean-up and investments, the main source of funding for the EFs was proceeds from environmental taxes and fees (Bluffstone, 1999; in Sterner: 319). Funds generated through EFIs can also be used to cover the costs of indispensable monitoring and enforcement activities. For example, revenues from the Marine Resources Fund levy in Namibia were used primarily to finance fisheries research and training, as well as a state of the art monitoring, control and surveillance (MCS) system (Nichols, 2003).

#### Contribution to poverty reduction

There are many ways in which EFR can benefit the poor considerably, both in the short and long run. Perhaps the most important channel through which EFI yields better outcomes for the poor is through improving environmental quality.

EFIs can help reduce poverty by addressing those environmental problems that matter to the poor. We have already seen how EFIs can play a role in improving environmental health. EFIs can also contribute directly to improving poor-peoples' access to basic environmental goods such as clean water, by improving environmental infrastructure and services. In the longer-term, EFIs can contribute to pro-poor growth by increasing the long-term productivity of natural resources. It is clear then that improved environmental quality and improved access to a range of environmental goods and services will improve peoples' well being and contribute significantly to poor people's opportunities for moving out of poverty. In a number of developing countries with far-sighted and progressive governments, such as Tanzania, this has been recognised to the extent that EFIs have been integrated in to national poverty reduction strategies.

EFIs can be designed specifically to benefit the poor by generating revenues that can be used for financing social programs. EFIs for example generates additional revenues to improve access to water and energy services for the poor. While this does not always occur – and it often requires strong pressure from excluded groups – it can occur as it did in Argentina during the 1990s (see box AI)

#### **Box AI: Promoting improved access to electricity to the poor in Argentina**

In urban areas, privatisation and increased user charges initially led to those least able to pay – the illegally connected “colgados” (hangers) in urban slums – being disconnected. Electricity losses of 27% pre-privatisation were drastically reduced. This led to greater anger and several court cases were brought on behalf of the colgades. With mounting media coverage and public pressure, the federal government, provincial government of Buenos Aires and two private distribution companies entered into a “Four year framework agreement”. The companies were reimbursed for unpaid balances by illegally connected shanty towns and subsidies

were provided for establishing collective meters. In turn, companies agreed to waive any claims on unpaid bills since 1992 and to install 10,000 meters a month in low-income areas. As a result of the framework agreement, roughly 650,000 users were formally connected to the network.

Source: WRI, 20002 and Chisari and Estache, 1999

### *The importance of a systematic approach and a structured process*

While international experience shows that there are multiple and considerable potential benefits from applying EFIs, it also shows that successful implementation hinges on strong political leadership, sustained commitment and a carefully managed process. Where implementation has been weak the reason has often been poor instrument design and a failure to recognise, balance and integrate stakeholders' interests. Therefore, it is particularly important to involve stakeholders at various stages in the policy development process.

The UK government's approach is exemplary in its careful management of the policy process, from instrument design to implementation and monitoring. The process that the UK government adopted in determining whether and how to intervene involved a number of steps. For each of the policy measures, the Government first identified the **environmental policy objective** and assessed the rationale for, and the costs and benefits of, intervention. This usually involved **extensive research**. Where there was a case for intervention, the Government then determined the **most efficient instruments** (fiscal *and* non-fiscal) for achieving the objectives, and considered synergies and trade-offs with other economic and social objectives. Following this the Government took forward the process of **policy development and implementation**, which involved thorough **consultation with stakeholders**. In the case of the UK climate change levy (CCL), for example, an **Advisory Committee on Business** and a high-profile taskforce were set up for the purpose of conducting consultations with a wide range of stakeholders over the issues involved. The consultation paper that was issued as a result, played a crucial role in informing the design of the CCL.

As soon as it becomes clear that new or additional intervention is likely to be necessary, a **public announcement** to that effect is made. Thus the likelihood that a tax on aggregate extraction would be introduced was signalled a year before the design phase, and three years prior to implementation. **Early warning** is important to give affected parties the time to prepare and adapt to the proposed changes. This is followed by active evidence collection (usually by independent research institutions). Once decisions have been made on the type of policy mechanism to use, there is **further consultation on the design of measures and the shape of the overall package**, including recycling of revenue from environmental taxes. Introduction of the climate change levy, the aggregates levy and landfill tax, have all been accompanied by a reduction in employers' national insurance contribution. Also, each of these contained an element of revenue recycling related to the objectives of the respective taxes.

Finally, **continuous monitoring and evaluation is a crucial element of success**: it is needed to identify and remedy problems as they emerge as well as to demonstrate benefits of the intervention to those affected. Good monitoring and evaluation also

needs to be complemented by flexibility in updating objectives and approach as unintended consequences emerge and new information becomes available through the monitoring and evaluation process.

**Box AII: Improving environmental quality through taxation – the UK experience**

In 1997 the UK Government spelt out its objectives and laid down the guiding principles for using environmental taxes, in its **Statement of Intent** on environmental taxation. This document has been effective in providing a framework for these policies. Since 1997, the Government has introduced a range of new environmental taxes to address specific environmental problems, such as the climate change levy, the aggregates levy and the landfill tax. As a result, the UK is now on track to meet targets for reducing greenhouse gas emissions under Kyoto Protocol. The Government has also reformed or changed a number of other taxes so that they give greater environmental incentives. Thus, for example, fuels duty differentials have been used to favour cleaner fuels, the graduated vehicle excise duty (VED) to favour less polluting cars has replaced its non-graduated precursor, and a distance-based lorry road-user charge was introduced. Areas in which further work is currently being undertaken on the use of EFR includes: waste, agriculture, transport, and domestic energy efficiency.

Introduction of the climate change levy, the aggregates levy and landfill tax have all been accompanied by a reduction in employers' national insurance contribution. Also, each of these contained an element of revenue recycling related to the objectives of the respective taxes.

Source: HM Treasury (2002)

The example of Thailand also shows the importance of process:

**Box AIII: Introducing fiscal incentives to reduce urban air pollution – the case of Thailand**

Until the late 1980s, petroleum products (including kerosene, diesel, fuel oil, and LPG) were heavily subsidised in Thailand, because they were regarded as vital to the population's livelihood. The resulting distortions led to inefficient use of transportation fuel, high levels of air pollution with serious impacts on health, and fiscal deficits. In 1991 the Government of Thailand – pressed by concerns about the seriously harmful effects of lead pollution on the population and the environment – embarked on an ambitious program to phase out the use of leaded gasoline. This was a complex task, impacting on many sectors. However the Thai policymakers managed to surmount the obstacles encountered and successfully completed the process in four and a half years, one year ahead of schedule. A crucial success factor was reliance on fiscal incentives to favour unleaded gasoline (ULG).

In 1991 as the government introduced ULG the prices of all oil products (except LPG) were deregulated. Taxes on diesel fuel were increased by B0.4 per litre at the commencement of this deregulation. To encourage the switch to ULG, the government stipulated that the retail (pump) price of ULG should be B0.3 (US\$0.012) per litre less than that of leaded gasoline. By setting the excise tax on

ULG at B1.0 (US\$0.04) per litre less than that for leaded fuel the GOT absorbed most of the costs at B0.7 per litre. These costs were, however, more than offset by the benefits of improved public health: airborne lead dramatically declined from 1.55 micrograms per cubic meter in 1991 to 0.1 micrograms per cubic meter in 1996. Associated health benefits have been estimated at US\$0.56 per litre. Savings in terms of avoided health costs are estimated at approximately at an annual value of US\$2bn, or US\$270 per capita in 1996 prices.

In sum Thailand's lead phase-out program was cost-effective, and benefits far outweighed the cost. This achievement was the result of a collaborative approach involving key stakeholders and decision-makers, including government agencies, representatives of oil companies, and automobile manufacturers. Success in this case was crucially dependent also on governmental institutions taking vigorous leadership and managing all steps of the process including setting target dates for implementing key actions, using price and fiscal incentives to favour ULG, and assuring continual monitoring and follow-up evaluation. Consultation and consensus building was essential to the success of the change-over. These activities should be supported with high quality consumer research, public education, and training, and adequate resources to study technical issues as they arise.

Source: Sayeg (1998)