

Exploring and Developing Environmental Economic Policies for China in the New Era

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The environmental economic policies are mechanisms and regimes that regulate and influence people's behaviors of making or eliminating pollution and ecological degradation aiming at socio-economic sustainable development by employing such economic leverages as financing, taxation, pricing, credit, investment, and market instruments based on the theories of environmental economics and market economics. Currently, China is in a new era with its socio-economic development and environmental protection in profound reformation and transition. Therefore, actively exploring environmental economic policies is an important way to facilitate the unconventional leaping forward development of environmental protection and the building up of environmentally friendly society. The publication of the "Environmental Economic Policies Series" (hereinafter referred to as "EEP Series") is just a try in this regard. This paper as the general foreword of the EEP Series will make the review and outlook on the studies and practices of environmental economic policy in China.

1. Economic incentives mainstreaming the environmental policy reform

Internationally, the active use of environmental economic incentives prevails in environmental policy reform and innovation. Usually there are two kinds of environmental policy – the command-and Control measures (hereinafter referred to as CACs), e.g. emission standard and permit, and the economic incentives, e.g. taxation, emission trading, and subsidy. In recent 10 years, such things as information openness, voluntary agreement, and public participation have been increasingly promoted in environmental policy development and implementation thus enhancing the economy, flexibility, effectiveness, and democracy of environmental policies. Internationally, the environmental policies have got rapid development in the past more than 30 years, which have extended from the traditional national environmental affairs to international environmental issues, e.g. the clean development mechanism (CDM), emission trading, and carbon tax, etc. in the field of climate change. The latest international classification of environmental policy is to put them into four groups – utilizing market; creating market; laws, regulations, and standards; and information and voluntary measures, in that the laws, regulations and standards are CACs, commonly used mainstream policy measures in all countries.

In addressing the increasingly complicated environmental issues of nowadays, depending only on CACs may easily cause new problems, thus leading to low effectiveness or being of no effect, even resulting in an outcome opposite to the expectation. To look at the international progress in environment and development, the market-based measures have more advantages than CACs in reducing the cost of environmental protection, improving administrative efficiency, decreasing governmental subsidy, and increasing fiscal revenue. The environmental economic policies are to regulate the interests of different market entities related to

environmental resources by internalizing the externality of their environmental behavior aiming at building up of the incentive and constraint mechanism for the protection and sustainable utilization of resources and environment. The environmental economic policy is a kind of “intrinsic constraint” rather than the “external constraint” exerted by traditional administrative measures, which can promote environmental technology innovation, enhance market competitiveness, and lower the costs of environmental control and administrative monitoring and supervision.

The environmental economic policies as the important tool of environmental management have got a widespread application in more and more countries due to their evident advantages. According to the statistics of OECD in 2009, 375 environmental taxes and 250 environmental fees have been established in OECD member states at different administration levels, in which 150 environmental taxes are energy related, 125 environmental taxes are motor vehicle related, and 75 environmental fees are directly related to pollutant discharge; meanwhile, more than 50 deposit systems, 210 environmental subsidy systems, and more than 50 emission permit trading systems have been established. The European Climate Change (ECX) and Chicago Climate Exchange (CCX) were established in Amsterdam and Chicago respectively

2. China’s environmental management in transition calling for more use of environmental economic incentives

At the sixth national conference of environmental protection, Premier Wen Jiabao emphasized in his remarks that “to protect the environment in the new circumstances, following three shifts have to be accelerated: first, to shift from paying more attention to economic growth than to environmental protection to attaching equal importance to both environmental protection and economic growth, pursuing development in the process of environmental protection; second, to shift from the situation of environmental protection lagging behind the economic development to a state of environmental protection and economy having synchronous development. Endeavor to make no new environmental debt and pay back the old environmental debt as much as possible, changing the situation of generating pollution first and then treating the pollution or the environment being damaged while being treated; third, to shift from mainly relying on administrative measures to tackle environmental issues to comprehensively utilizing legal, economic, technological, and necessary administrative measures to address environmental issues, consciously conforming with the economic and natural laws and improving the effectiveness of environmental protection.” This conference marked the beginning of a new stage of China’s environmental protection, in which environmental management requires that great importance be attached to the use of market economic incentives and to the role of public participation while emphasizing the leading role of governments.

In the context of emission reduction, the environmental economic policies have been the effective means in achieving the emission reduction targets. It was clearly presented in the “Outline of the Eleventh Five-Year (2006-2010) Plan for National Economic and Social Development” that, as a binding target, the total discharge amount of COD and SO₂ by the year of 2010 shall be 10% less than that in 2005. This is a serious commitment of Chinese government to the whole society. It is expected that the target is very likely to be fulfilled. Facts have proved that two economic policies, i.e. electricity price subsidy for desulphurization in power plants

and urban wastewater treatment fee are the pillar policies of facilitating emission reduction. At present, the general trend of environmental pollution in China is still rising with quite stern state of eco-environment. China ranks the first place in terms of the discharge of almost every kinds of pollutant with its environmental quality far from the requirements of building a well-off society. In the coming years, China will remain in the period featured by high growth of energy consumption and high risk of environmental pollution with pollution reduction being a long-term and tough task. Therefore, it is a must to proactively employ economic incentives to promote emission reduction and the fulfillment of medium- and long-term environmental protection targets.

In terms of the practical need of environmental management, the market-based environmental input mechanism and the improved public finance budgetary system are the important guarantee for environmental protection. With more and more attention to environmental issues paid by governments at all levels and society, the total amount of environmental investment is increasing with the statistical nominal investment accounting for 1.4% of GDP. The environmental investment and financing mechanisms are changing greatly with the deepening of economic reform and investment and financing system reform. A new pattern of environmental investment and financing with diverse investment channels and multiple investment entities is shaping. There remain some problems in China's environmental input mechanism, mainly reflected in: 1) there is no clear definition of government's responsibilities in protecting the environment under conditions of market economy as to what issues should be dealt with by governments and what issues can be solved by market; and there is no clear breakdown of responsibilities between governments at different levels. 2) The effective environmental input is insufficient, hard to meet the need of China's environmental protection; there is no appropriate input mechanism for addressing the legacy of environmental issues. 3) The effectiveness/benefit of environmental investment has been low with some completed projects could not function as originally designed. In addition, the complete public finance budgetary system for environmental protection has not been established. The division of financial responsibility between central government and local government with regard to environmental protection is not clear though environmental protection has become an independent item in the new central public finance budget. Therefore, it is necessary to accelerate the development of environmental public finance and taxation policy system.

3. Four basic principles in developing environmental economic policies both at home and abroad

What are the basic principles or footstones in developing environmental economic policies? It is commonly considered that the "polluter pays principle" (PPP) is the most important principle. It can be said that the evolution history of environmental economic policies is just an evolution history of PPP. The PPP is an economic principle for environmental protection, according to which polluter has to pay for the pollution generated by him/her and bear the costs of treating the pollution. It was originally presented by the environmental committee of OECD in 1972, and its definition was amended and further improved in 1974 and 1985 by enlarging its connotation. When this concept was first introduced into China, it was explained as "those who created the pollution should clean it up", thus making a small "detour" in China's environmental policy study and practice. Nowadays, the PPP, through its

application in environmental protection in the past more than 40 years, has become the footstone of both national and international environmental policies. At the same time, a variety of environmental economic incentives based on PPP have been developed and implemented in many countries. The air pollution fee was first imposed in the United States in 1972. Afterwards, SO₂ tax was imposed in OECD countries of Sweden, Italy, and Norway, etc.; NO_x tax/fee has been levied in Sweden and Italy since 1990; Since 1994, the carbon tax has been developed and levied based on PPP in Nordic countries and UK, the first time that PPP being extended to international environmental policy field.

In 1980s, PPP was extended into the area of environmental services, i.e. “User Pays Principle” (UPP) was presented based on PPP. The UPP may have more effectiveness than the PPP in dealing with some special pollution issues concerning public consumption. For instance, for those who generate small quantity of pollutant and can not treat the pollution by themselves in an economically feasible manner, the most cost effective way is to resort to centralized treatment facilities to have centralized treatment of their pollution discharge. In this way, those who discharge pollution become the users of centralized treatment facilities and get the right to use the public facilities only by paying for that. In this case, PPP has evolved into UPP in that payment is closely linked to the quantity of service, and the payer is just the beneficiary. Most countries in the world have established charging system based on PPP for urban waste water treatment and solid waste disposal thus guaranteeing the construction and operation of urban environmental facilities. In 1992, the UN Rio Declaration on Environment and Development clearly stated in principle 16 that “national authorities should endeavor to promote the internalization of environmental cost and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution...”.

Either of PPP and UPP is targeted on environmental pollution control. Based on the specific circumstances of China’s environmental protection, two eco-economical policy principles can be derived from PPP. One is “Beneficiary Pays Principle” (BPP); another is “Destroyer Pays Principle” (DPP). BPP is mainly employed to deal with issues of paying for ecological services and ecological compensation. According to this principle, the beneficiary individuals or regions should pay for the sacrifices of other individuals or regions who give up their development opportunity in order to conserve a specific eco-environment or to improve environmental quality. DPP requires that destroyer should pay for his/her behavior that causes damage to ecological habitat and natural resource. Thus, PPP, UPP, BPP, and DPP constitute a relatively complete principle system of environmental economic policies.

4. Environmental economic instruments and their application in China

There are many types of environmental economic policy subject to different scholars and institutions. Both OECD and the World Bank have presented classification of environmental economic policies for different period of time. To look at the relations between environment and economy from the macro point of view, environmental economic policies are regulating tools to coordinate the relations between socio-economic development and environmental protection, such as green credit, green finance, and green taxation, etc. To look at the environmental economic policies from the relatively narrow sense of environmental management system, they are complementary management system or measures to the existing environmental

laws, regulations, and standards. In this sense, environmental economic policies are environmental economic instruments or environmental economic incentives (EEIs), such as emission fee and emission trading systems that are related to total emission control. The environmental economic policies are usually defined by western scholars as market-based instruments (MBIs) which are further divided into price-based instrument (e.g. environmental tax and emission fee) and quota-based instruments (e.g. emission trading). The former was represented by Pigou pollution tax (Arthur Pigou, 1932) in that pollution was considered as an external diseconomy on which appropriate pollution tax or emission fee should be imposed in order to internalize the external costs and to control the pollution at an expected level. Usually we call those price-based instruments the European environmental economic instruments because of their successful use in European countries. The representative of the latter is Coase emission trading (Ronald Coase, 1968). It is believed that, once the property right is well-defined and the transaction cost is zero, prices of environmental resources can be established among market entities and the trading of environmental resources can be conducted, thus effectively resolving the issue of externality. Usually we call those quota-based instruments the American environmental economic instruments because of their successful use in the United States.

Policy departments usually classify environmental economic policies in terms of policy target and policy implementation. In terms of policy target, environmental economic policies can be divided into economic policies for pollution control (e.g. emission fee), policies related to environmental facilities (e.g. wastewater treatment and solid waste disposal charges), and policies for the conservation of eco-environment (e.g. ecological compensation). In terms of policy implementation, environmental economic policies can be divided into market creation policies (e.g. emission trading), policies on environmental taxes and fees (e.g. environmental tax, emission fee, and user pays), finance and capital market instruments (e.g. green credit and green insurance), and financial incentives (e.g. financial subsidy and money transfer for ecological compensation, etc). Relatively speaking, Chinese scholars define the environmental economic policies in a more broad sense than western scholars. Some Chinese scholars even considered that all economic policies as long as they are related to environment should be classified as environmental economic policies. Though it is of theoretic and academic significance to explore the classification issue of environmental economic policies, the major concern of the policy makers and implementers is the connotation, implementation cost, and effectiveness of the environmental economic policies.

To date, all kinds of environmental economic policies developed in other countries have been introduced into China and had cases of their application in China, and, in particular, emission fee, urban wastewater treatment charge, urban solid waste disposal fee, electricity price subsidy for desulphurization in power plants, environmental public finance, and green credit, etc. have been implemented at the national level. Such policy measures as emission trading, ecological compensation, environmental insurance, and green security are being implemented on the trial basis in many places. In general, the exploration and study on environmental economic policies are in an unprecedented development stage. Since 2006, the Ministry of Finance and Ministry of Environmental Protection have developed environmental public finance policy and established 10 special funds for environmental protection to support emission reduction and rural environmental protection. The National Development and Reform Commission and the former State Environmental Protection Administration jointly developed electricity price subsidy policy for the

desulphurization of coal-fired power plants in 2007 that greatly facilitated the SO₂ emission reduction of power plants in the “11th Five-Year Plan” period. In 2007, the Ministry of Environmental Protection and China Banking Regulatory Commission jointly developed green credit policy and started its trial implementation at local level. The Ministry of Environmental Protection and China Insurance Regulatory Commission jointly developed environmental liability insurance policy in 2008 and its trial implementation at local level has started. Jiansu, Zhejiang, Hubei, Hunan provinces and Tianjin municipality have been selected in succession by the Ministry of Environmental Protection and Ministry of Finance to conduct emission trading on the trial basis, and it is expected that laws and regulations related to the paid use of emission quota and emission trading will be put in place in 2010. The Ministry of Finance, State Administration of Taxation, and Ministry of Environmental Protection started to develop a pilot programme of environmental tax and carbon tax. It is expected that the levying of environmental tax may start some time in the “12th Five-Year Plan” period. The National Development and Reform Commission started the work of developing the “National Regulation on Eco-environmental Compensation” in 2010. A full coverage of the studies and practices of various kinds of environmental economic policy will be given in the EEP Series, and not to repeat here.

5. Efforts made by major international institutions in developing and reforming environmental economic instruments

The study on environmental economic policies has become the research focus and hot topic of environmental economics. A great deal of theoretical studies has been done since 1970s in western countries laying emphasis on pollution tax and emission trading which can be found from both research literatures and policy implementations. Many universities and research institutions in North America and Europe have put their research emphasis mainly on the theory and methodology of environmental economic policies, whereas the UN organizations and intergovernmental organizations (e.g. OECD, World Bank, World Resources Institute, UNEP, Asia Development Bank, etc.) are focusing on the development of environmental economic policies and their implementation. OECD has been recognized as an authoritative international institution in conducting systematic study on environmental economic policies. A database of international environmental economic policy has been developed by OECD. In recent 30 years, a good deal of studies has been conducted in the field of environmental economic policy in the world, accumulating lots of experiences in policy implementation. Nowadays, the environmental economic policy has become a field with fastest development in environmental economics. In this context, following international institutions are established in succession: Association of Environment and Resource Economists (AERE), European Association of Environment and Resource Economists (EAERE), and East Asia Association of Environment and Resource Economists (EAAERE), thus greatly promoting the study and practice of environmental economic policies. EAAERE will convene the “First Conference of East Asia Environment and Resource Economists” in August 2010 in Sapporo, Japan to explore the academic development of environmental economics and policies. The application of environmental economic policies has been extended from the national environmental issues to global environmental issues, e.g. the emission trading in the field of climate change.

The study and practice of environmental economic policies in China would be

impossible without the support of research institutions and experts both at home and abroad. In the past 20 years, OECD, World Bank, Asia Development Bank, UNEP, and US EPA, etc. have been very supportive to China's empirical studies on environmental economic policies. Some study projects on environmental economic policy such as emission fee, environmental tax, and ecological compensation had got the financial and technical support of those organizations. OECD is the first international organization to facilitate the research of China's environmental economic policies in the early time, mainly making a comprehensive introduction of the studies and experiences of environmental economic policies in OECD countries to China. A "Series of OECD Environmental Economics and Policies" edited by Dr. Wang Jinnan was published in 1996, which systematically presented the progress of environmental economic policy research and practice in OECD to Chinese readers. The US research institution - Resource for the Future (RFF) has actively promoted the use of market instruments in China's environmental protection. The late Dr. Walter O. Spofford Jr. of RFF, in cooperation with Prof. Ma Zhong of Renmin University of China organized and published the "Series of RFF Environmental Economics" in early 1990s. It deserves special mentioning that Mr. Michael Potier and Dr. Brendan Gillespie of OECD, Prof. Milton Russell of University of Tennessee, Dr. Walter O. Spofford Jr. and Dr. Richard Dick Morgenstern of RFF, Dr. Robert Crooks of World Bank, Dr. Daniel J. Dudek of US Environmental Defense Fund, Dr. Jeremy Schreifels of US EPA, and Prof. Jeremy J. Warfors, UK senior environmental economist have made their own contribution to the development of China's environmental economic policy studies.

In the meanwhile, some international environmental groups have also paid attention to environmental economic policy studies in China. The Professional Association for China's Environment (PACE) has organized five international workshops on environmental economic policies since 2000, playing an important role in enhancing the exchange between Chinese environmental economists and their foreign counterparts and in training post-graduates majoring in environmental economics. US Environmental Defense Fund (EDF) has long been promoting the development and utilization of market-based environmental economic instruments in China, giving support to the study and pilot implementation of emission trading in the context of total emission control organized by former State Environmental Protection Administration and local EPB in late 1990s. In recent 10 years, US Energy Foundation (EF) has actively supported the study and development of China's environmental economic policies, such as studies of emission fee, environmental tax, carbon tax energy tax, and environmental finance products.

6. Progress of China's environmental economic policy study in the past decade

In recent 10 years, many research institutions of environmental economics have been established in succession with the increasingly enhanced attention to environmental economics and environmental economic policies in China. According to the statistics, to date, there are more than 40 institutions nation-wide specializing in the study of environmental economics and policies. Many universities have had the master and doctor programme of environmental economics, thus directly facilitating the study on environmental economic policies. The Chinese Academy for Environmental Planning of the Ministry of Environmental Protection, College of Environmental Science and Engineering of Peking University, Department of

Environmental Science and Engineering of Tsinghua University, School of Environment & Natural Resource of Renmin University of China, Policy Research Center for Environment and Economy of MEP, and the Research Institute of Fiscal Science of the Ministry of Finance are the major institutions of implementing the above-mentioned study projects. The studies conducted by the Chinese Academy for Environmental Planning and other institutions in particular have made unique contribution to the practice of environmental economic policies in China. In recent couple of years, some research institutions affiliated to government department of comprehensive economic affairs, such as the Research Institute of Fiscal Science of the Ministry of Finance, Research Institute of Taxation Science, State Administration of Taxation, Development Research Center of the State Council, and the Academy of Macro-economic Research (AMR) of the National Development and Reform Commission have also engaged in the study of environmental economic policies, thus greatly pushing the development of environmental economic policies. With regard to the civil academic groups, the Chinese Society of Environmental Sciences has paid great attention to the study of environmental economic policies and created a sub-society of environmental economics which has organized six seminars on environmental economic policies and constructed an internet based information platform of environmental economics. There are 20 sections in this platform, covering every study fields of environmental economics and presenting the latest development of studies and practices of environmental economic policies in China from different dimensions.

The study and practice of environmental economic policies in China started in the late 1970s and was focused on emission charging system in the early stage. Since 1990s, government department have paid attention to the development and implementation of environmental economic policies, giving an impetus to the study and development of environmental economic policies in China. In recent two decades, a great deal of policy studies on environmental economics has been conducted in China and some experiences have been accumulated with regard to the design and implementation of environmental economic policies. The typical studies mainly include: 1) “Study on China’s environmental economic policies”, “Comparative study of China-OECD environmental taxation policies”, and “Study on China’s environmental investment and financing and their pilot implementation”, etc. jointly conducted by the former State Environmental Protection Administration and OECD; 2) “Study on environmental economic policies under market economy regime”, “Design of China’s emission fee system and its implementation”, “Study on China’s industrial pollution economics”, and “Study of policy innovation for China’s water pollution control”, etc implemented by former State Environmental Protection Administration and World Bank since 1990s. Among those research projects, the “Design of China’s emission fee system and its implementation” had got a budget of 10 million RMB Yuan being a research project in the field of environmental policy with largest financial input in China so far. Most of the outcomes of this project had been employed in the reform of pollution emission fee system in 2003; 3) In recent 10 years, China Council of International Cooperation for Environment and Development (CCICED) has organized and completed following projects – “Study of environmental and natural resource pricing and taxation”, “Study of investment and financing policies for environmental protection”, “Study on eco-compensation mechanisms and policies”, and “Study on economic policies for improving energy efficiency; etc., thus promoting China’s research on environmental economic policies in a top-down manner; 4) Since 1980, the Asia Development Bank has been providing

financial support to the implementation of projects of “Strengthening environmental management by employing market economic instruments”, “Study of SO₂ emission trading system in Taiyuan municipality”, and “Controlling China’s water pollution by employing market instruments”, thus facilitating the utilization of market economic instruments by local governments to protect the environment; 5) Since the “10th Five-Year Plan” period, the Ministry of Science and Technology and the former State Environmental Protection Administration have organized the “Study on the ecological compensation mechanism and policy implementation”, “Study on the design of environmental taxation policy and its implementation”, “Study of the national economy accounting framework”, and “Study on the technology and implementation of SO₂ emission trading in power industry”, greatly promoting the study of some important environmental economic policies; 6) In 2007, a thematic study on China’s environmental economic policies was conducted under the programme of “Study of the environmental macro-strategy” jointly organized by the former State Environmental Protection Administration and the Chinese Academy of Engineering. This thematic study was a project that integrated the key research institutions for policy study to systematically study the reform of environmental economic policies and to develop a framework and roadmap for the reform of China’s environmental economic policies in the new era; 7) In 2008, several studies on environmental investment and financing policies, environmental public finance, water environmental tax/fee, water environment pricing policy, paid use of emission quota, river basin ecological compensation, and water pollutant discharge trading, etc. were arranged within the “Study of water body pollution control strategy and policy demonstration” which was the six thematic study of the national key science & technology programme of “Water body pollution control and treatment”. This a large scale project for systematically conducting economic policy study and demonstration in the field of water environmental protection.

7. Progress of China’s environmental economic policy study made in the last decade and existing problems

In the past decade, the researcher team of China’s environmental economic policy has been growing continuously with increasingly improved academic level of its studies. In July 2009, the Chinese Society of Environmental Sciences completed the “Report on the subject development of environmental economics in China” in which a statistical analysis was done on the trend of postgraduate thesis output and the quantity of published academic papers on eight environmental economic policies of emission trading, environmental tax, ecological compensation, environmental finance, green credit, environmental insurance, green capital market, and emission fee. Analysis results show that the output of postgraduate theses and the quantity of published academic papers on environmental economic policies are growing relatively fast in recent years, which is coinciding with the practical development and need of environmental economic policies in China. There were few graduate theses before 2001. However, in 2001-2007, 316 master theses were produced, of which 120 papers were produced in 2007 and only 3 papers in 2001. The quantity of master theses increase 40 times in six years with an annual growth rate of 338%; With regard to doctor dissertation, the quantity of doctor dissertation related to environmental economic policies began to rise in 2007. Before 2001 there was basically no doctor programme of environmental economic policy study. There were only two doctor dissertations produced in 2002 and this output level had been kept until 2006. The

quantity of doctor dissertations produced in 2007 increased to 10 papers. The amount of doctor dissertation is apparently less than that of master thesis, being 6% of the latter. This is due to the fact that there are few doctoral programmes of environmental economics in China's universities and research institutions, and also reflects the fact that there is no adequate capacity to conduct high-level innovative academic research in China.

The "Report on the subject development of environmental economics in China" indicated that though the quantity of published academic papers has been increasing continuously, the quality of them has been uneven, and the internationalization level of those studies is not high. According to statistics, there are 1763 papers on the subject of environmental economics published in Chinese core journals in the past 30 years in which 393 papers were published in 1980-2000, and 1370 papers were published in 2001-2007, being 3.5 times of that published in the previous 20 years. In the seven years from 2001 through 2007, the average annual output of papers published in Chinese core journals was around 200 papers with an annual growth rate of 19.3%. In recent 10 years, there are 322 papers being listed in Chinese Social Science Citation Index (CSSCI) with annual average output of 36 papers and annual average growth rate of 30%, in which the amount of cited paper in 2006 was 5 times of that in 1998. Both quantities of papers published in Chinese core journals and the papers included in CSSCI are increasing, indicating that more and more attention has been paid to the study of environmental economic policies by the academic community in China. The amount of papers by Chinese scholars included in the Science Citation Index (SCI) and Social Science Citation Index (SSCI) has also shown an increasing trend after 2000, though the total amount is still small. In recent 8 years, the amount of SCI and SSCI papers by Chinese scholars is 10 and 13 papers respectively, of which the total amount and growth rate are much smaller than that of papers published in Chinese core journals and CSSCI. This suggests that the internationalization level of study outcomes by Chinese scholars is still relatively low though the Chinese researchers have paid more and more attention to the international expression of their study outcomes. Chinese researchers of environmental economic policies should make further efforts in displaying their study outcomes internationally in future.

By reviewing the research and exploration of China's environmental economic policies in the past 20 years, following points can be drawn: 1) there have been few in-depth researches on theories and methodologies of environmental economic policy. This is intrinsically related to the current subject development level of environmental economics, thus resulting in inadequate discussion on some important theoretical issues related to environmental economic policies and even affecting the implementation of those policies. 2) Researches on theories and methodologies of environmental economic policy have been decoupled with policy practices. Researchers in universities are mainly focusing on the conceptual and theoretical explanation of environmental economic policies, whereas researchers focusing on decision support are tending to overlook the study of theories and methodologies, putting more emphasis on policy development and implementation. 3) There is no top-level design of environmental economic policies. The government departments who have the decision-making power in the development and implementation of environmental economic policies have not become the designer of environmental economic policies due to their different opinion on the roles and functions of environmental economic policies. Therefore, it is very difficult to realize the top-level design of environmental economic policies in the true sense. Even if the top-level

policy roadmap could be designed by departments that have relatively weak decision-making power, it would not play a “top-level” role. 4) There are no adequate study of and attention to the relevancy among different environmental economic policies. The identification of specific economic policy study and development is subject to the preference of policy study, development, and implementation departments, or interest conflicts between policy implementation departments. This kind of practice may lead to the situation of disharmony between policies and even “pulling the rug from each other’s feet” between policy departments. 5) The policy development at the national level lags behind that at local level. Some environmental economic policies that have been repeatedly required by the State Council to be studied and developed in an expedited manner remain in the state of slow development. There is no effective guidance from the central government for the pilot implementation of policies at local level. 6) The legal basis of policies is insufficient. Most of environmental economic policies are presented in government documents without adequate legal basis out of important environmental laws, thus causing difficulty in the pilot implementation of policies at local level.

8. Objectives and key tasks of National Environmental Economic Policies Piloting Program launched by MEP

With the development and continuous improvement of market economic mechanism, government has paid more and more attention to environmental economic policies that integrate environmental protection and economic development. To facilitate the historical shift of environmental protection, the Ministry of Environmental Protection, in cooperation with other relevant government departments launched the National Environmental Economic Policies Piloting Program (NEEPPP) in the “11th Five-Year Plan” period, in which the study of key economic policies was mainly focused on such areas as environmental taxation, ecological compensation, emission trading, green capital market, and pollution reduction, etc. The program is to facilitate the issuance and implementation of key environmental economic policies by combining the theoretical methodology study and pilot implementation with the goal of, through about 10 years efforts, preliminarily shaping up of China’s environmental economic policy system in the new era, which should fairly in conformity with the scientific concept of development. Facilitated by this program, the study and pilot implementation of China’s environmental economic policies have got evident progress during the “11th Five-Year Plan” period; especially some bold practices being conducted at the local level have provided experiences that are useful for the development and issuance of national environmental economic policies. The Chinese Academy for Environmental Planning, as the technical support institution of the program has released the 2007, 2008, and 2009 annual reports on the pilot implementation of environmental economic policies.

The National Environmental Economic Policies Piloting Program is a platform for the research of environmental economic policies with following main tasks: 1) Building up the environmental economic policy system in the new era. Develop and suggest a complete environmental economic policy system under new circumstance taking consideration of national socio-economic development trend and the environmental requirements in building up a well-off society, and provide with a guidance of medium- and long-term reform of environmental economic policies; 2) Improving the environmental public finance system in the new era. Based on the principle of “environmental responsibility is matched with environmental financial

power”, the scope, target, and size of public environmental finance expenditure should be clearly defined at both central and local levels. Establish the performance assessment system for public environmental financial input and establish the government green procurement system. Explore the feasibility of establishing the central environmental protection fund. Increase the proportion of public finance in the environmental protection input, and improve the environmental effectiveness of public financial input; 3) Study on the creation of a stand-alone environmental taxation system. Develop and suggest a policy framework of China’s environmental taxation, and strive for a breakthrough in the development and implementation of the stand-alone environmental taxation policy, thus laying down a financial and taxation policy foundation for the construction of environment-friendly society. In the study of the stand-alone environmental taxation system, the focuses are on pollution discharge tax, polluting product tax, eco-environmental protection tax, and carbon tax. 4) Study of ecological compensation policies. Develop and suggest the framework of national ecological compensation policies. Put forward ecological compensation schemes for nature reserves and key ecological function protection zones based on the national key function zoning. Study and design the ecological compensation scheme for mineral resource exploitation and conduct pilot implementation at the selected key areas of exploitation. Establish eco-environmental compensation policy system for river basins that cross provincial or municipal boundaries. 5) Explore the establishment of emission trading platform in the context of total emission amount control. Develop the legal regime for the paid use of pollution emission right and emission trading. Establish the management platform for the paid use of pollution emission right and emission trading. Construct the automatic monitoring system of key pollution sources and management network of pollution emission right and emission trading for pilot enterprises. Study the voluntary emission reduction and trading of CO₂ taking into account the experiences got in the above-mentioned pilot work. 6) Promote the greening of capital market. Conduct study and pilot implementation of technical support system of green credit, green financing instruments (e.g. green bond, green fund, and environmental protection lottery), innovation, environmental liability insurance, environment performance assessment of listed companies, and environmental accounting.

To explore China’s environmental economic policies in the new era, it is a must to create a supporting system for the study and pilot implementation of environmental economic policies. One thing is to construct an integrated and coordinated working platform. The study and pilot implementation of environmental economic policies requires the engagement of multiple departments and the inter-departmental coordination – this is the guarantee of success of the study and pilot implementation of environmental economic policies. Second is to organize an inter-disciplinary technical supporting team. Research of environmental economic policies corresponds to study on “natural environment plus society and economy” and involves ecology, environmental sciences, resource science, economics, and sociology. Therefore, the organization of the study team should take into account of the high level coordination and cooperation. The third thing is to clearly identify the working focus of different stages. The short term target should include not only some study outcomes but also the operable policy scheme and pilot implementation, focusing on the development of the stand alone environmental taxation policy, pilot implementation of river basin eco-environmental compensation, pilot implementation of the paid use of COD discharge quota and its trading, and pilot implementation of SO₂ emission trading in power sector, etc. Fourthly, work out a feasible implementation plan. To secure the

smooth conduct of the study of environmental economic policies, it is necessary to combine the policy design with policy implementation and combine the theoretical study with the pilot implementation of policies. With regard to the specific working content in each field, there need careful arrangement, general design, and stepped implementation. The last thing, but not the least, is to strengthen international exchange and cooperation. OECD and EU member states are taking the lead in the study and practice of environmental economic policies and have accumulated rich experiences in this regard. Enhancing the exchange and cooperation with those countries and such international organizations as World Bank, UNEP, and ADB will facilitate the study and implementation of environmental economic policies in China and let China's study and implementation of environmental economic policies be known by the world.

9. EEP Series is a presentation of China's research and practice in the field of environmental economic policy

The study of China's environmental economic policy system in the new era has been a complicated and arduous system engineering that is advancing with the times. Based on my personal experience, it will need at least 10 years for an environmental economic policy to be born from the inception of study to the issuance of the policy. This can be described as "Ten years for a policy". Though there is great deal of international experiences being worth of our learning, some issues remain to be addressed in both theoretical and methodological aspect and practice aspect of policies. This EEP Series being a summary of China's environmental economic policy studies to date is to provide a reference for researchers who are engaged in the vibrant on-going study of environmental economic policies. The main contents of the EEP Series involve environmental taxes/fees, emission trading, ecological compensation, environmental liability insurance, environmental public finance, environmental investment and financing, green securities, and green credit.

The publication of EEP Series has got the strong support of the Chinese Environmental Science Press who has included the publication of EEP Series in the 《National Publication Plan of Key Books for the "11th Five-Year Plan" Period》, thus upgrading the level of requirement of the EEP Series. In addition, the publication of EEP Series has got the financial support of the research projects of emission trading, ecological compensation, and environmental taxation, etc. It is my hope that the publication of EEP Series may facilitate the exchange between researchers and decision makers of environmental economic policies. I sincerely look forward to hearing the unreserved comments from readers of the EEP Series that will surely contribute to further advancing the exploration of environmental economic policies.

To make this EEP Series reflect the outcomes of environmental economic policy studies in a scientific, objective, and independent manner, no rigid editorial coherence is required for each book in the Series with regard to the goal of subject selection, concepts and terms, and technical methods, but rather allowing each book in the Series to be relatively independent and readable. We will add the book that reflects the latest research outcomes and is ready for publication to the Series based on the principle of "openness and seriousness" in order to let more people know and participate in the study of China's environmental economic policies. Due to the time constraint and our limited capacity, it may be inevitable for the EEP series to have some mistakes and inappropriateness to which please contact us (E-mail: wangjn@caep.org.cn) to give your criticism and correction.

Here, I would like, on behalf of the editorial committee of the EEP Series, to express our deep gratitude to authors and their research teams whose studies are the important theoretical basis and methodological support of the practice of environmental economic policies; I would also like, on behalf of the editorial committee of the EEP Series, to express our thanks to officials of relevant government departments who are responsible for the development and implementation of environmental economic policies. It is just your adventurous exploration and practice to make us sense the joy and happiness of conducting policy studies. Thanks also go to the Chinese Academy for Environmental Planning and the Chinese Environmental Science Press (CESP) for their support to the publication of the Series. Special thanks should go to Ms. Chen Jinhua of CESP for her careful organization and editing of the Series that make the early publication of the Series possible.

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