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Climate Change and Emission Trading Systems (ETS)

China's Perspective and International Experiences

Qin Tianbao

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Foreword

Provision of sufficient and affordable energy is a precondition for economic development and prosperity in every society. The fact that present-day industrialised countries are so prosperous is largely due to the exploitation of finite energy supplies such as oil, coal, natural gas and uranium. But the downside of these energy sources is a changing global climate that endangers our environment. For the Konrad-Adenauer-Stiftung global environmental and climate protection is not only a question of social and economic order. It is foremost an ethical obligation to protect the creation.

Green house gas (GHG) emissions from fossil energy sources are the main cause of global climate change. For this reason and since the conference of Kyoto 1997 emission trading systems (ETS) have become an important – and in terms of a global order policy – an efficient economic tool to reduce green house gas emissions.

The study of Professor Qin Tianbao, Research Institute of Environmental Law at Wuhan University (RIEL) provides a concise overview over international ETS and discusses their applicability to China in the framework of the overall environmental and climate policy of the People's Republic of China. China can learn a lot from the experiences made in the European Union, in Australia and in the United States and will hopefully introduce its own ETS in 2014. By doing this, China – as the largest emitter of GHG – would contribute to the goal of an effective reduction of GHG.

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Content

1. Introduction of CO2 ETS	6
2. International Experiences and Implications for China	13
2.2 US	20
2.3 Other Countries	27
3. Necessity of CO2 ETS in China	30
3.1 Internal Pressures: Unsustainable Development	30
3.2 External Pressures: Post-Kyoto Protocol Negotiation	44
4. Feasibility of CO2 ETS in China	54
4.1 Policy Support	54
4.2 Case Studies on ET of SO2	57
4.3 CDM Experiences	72
4.4 Case Studies on ET of CO2	76
5. Key Issues of CO2 ETS	77
5.1 Purposes and Principle	77
5.2 Mode of Emission Trading: "Cap and Trade" or "Baseline and Credit"?	78
5.3 Targeted Industries	79
5.4 Allocation of Emission Credits	79



1. Introduction of CO2 ETS

CO2 Emissions Trading Scheme (ETS) is an economic tool developed for the purpose of reducing greenhouse gas (GHG) emissions cost-effectively, which was initiated by and developed based on the three "market-based" mechanisms defined in the Kyoto Protocol¹ to the United Nations Framework Convention on Climate Change (UNFCCC)² as part of the response towards mitigation of global warming.

Global warming has been described as one of the greatest challenges for the twenty-first century.³ For

decades scientists have understood the processes by which emissions of CO2 and other gases might warm the planet through the so-called "greenhouse effect". The fundamental conclusion of the Intergovernmental Panel on Climate Change (IPCC) reports is that climate change is happening and CO2 emissions can increase the future risk of climate change. So far the most of climate change is driven by human actions. As a result there is a growing international consensus that global action is required to reduce human-induced GHG emissions and prevent further damage to climatic systems. Nevertheless it was not until the 1980s that the international concern about anthropogenic impacts on the atmosphere through such emissions gained prominence, and it was only in the last two decades of the twentieth century that the UN took the first steps towards recognizing and addressing the issue. These first steps led to the conclusion of the 1992 UNFCCC, followed by its innovative 1997 Kyoto Protocol.

With an ultimate objective of stabilizing GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system, the Convention sets an overall international legal framework for intergovernmental efforts to tackle the challenge posed by climate change. However,

¹ *Kyoto Protocol*, opened for signature 11 December 1997 (entered into force 16 February 2005). Text of the Kyoto Protocol is available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf> at 20 December 2011.

² *United Nations Framework Convention on Climate Change*, opened for signature 12 June 1992 (entered into force 21 March 1994). Text of the Convention is available at <http://unfccc.int/resource/docs/convkp/conveng.pdf> at 20 December 2011.

³ A consensus has been reached from a scientific, political, economic or legal perspective. See, eg, Kevin Watkins et al, *Human Development Report of 2007/08: Fighting climate change: Human solidarity in a divided world*, United Nations Development Programme (UNDP) Report (2007) <http://hdr.undp.org/en/reports/global/hdr2007-2008/> at 9 August 2011, and Carolyn Fry, *The Impact of Climate Change: The World's Greatest Challenge in the Twenty-first Century* (2008).



governments knew that its commitments would not be sufficient enough to seriously tackle climate change. The Kyoto Protocol was therefore adopted in 1997, which shares the Convention's objective, principles and institutions, and significantly strengthens the Convention by committing industrialized countries (Annex I Parties) to individual, legally-binding targets to limit or reduce their GHG emissions within a specific time frame. The individual targets for Annex I Parties are listed in the Kyoto Protocol's Annex B, which add up to a total cut in collective emissions of six GHGs⁴ by 5.2 per cent from 1990 levels in the commitment period 2008-2012. Developing countries (non-Annex I Parties) whose paramount task at present stage is the economic development and eradication of poverty are free of emission obligations during this period. To date, the US is the only industrialized country that has not ratified the Kyoto Protocol. Furthermore, Canada has formally withdrawn from the Kyoto accord in December 2011 due to its economic downturn.


The Kyoto Protocol, for the first time, sets binding Quantified Emissions Limitation and Reduction Ob-

⁴ The six gases include carbon dioxide, methane, nitrous oxide, sulfur hexa-fluoride, hydrofluorocarbons and per-fluorocarbons and are to be combined in a 'basket', with reductions in individual gases translated in to 'CO2 equivalents' that are then added up to produce a single figure.

jectives (QELROs) for industrial countries' anthropogenic emission by source, and removal by sinks⁵, of GHGs. However, the most innovative aspect of the Protocol may in fact not be these strict commitments but the introduction of the three market-based mechanisms. In order to fasten the massive reductions of GHG emissions necessary to stop the processes of climate change, three "financial mechanisms" – Joint Implementation (JI), the Clean Development Mechanism (CDM) and Emissions Trading (ET) – have been devised under the Protocol.

Joint Implementation (JI) is defined in Article 6 of the Kyoto Protocol. Under JI, an Annex I Party may implement an emission reduction project or a project that enhances removals by sinks in the territory of another Annex I Party and count the resulting Emission Reduction Units (ERUs) towards meeting its own Kyoto target. The sponsoring governments receive credits that may be applied to their emissions targets; the recipient nations gain foreign investment and advanced technology. Usually, it is cheaper to carry out energy efficiency work in transition countries, and to realize greater cuts in emissions by doing so.

⁵ Removal by sinks means removing carbon dioxide from the atmosphere, which could include the sequestering of carbon by land use, land-use change or forestry (LULUCF).



A JI project must provide an additional reduction in emissions by sources, or an enhancement of removals by sinks, in order to be carried out. Projects have to be approved by the Host Party and participants have to be authorized to participate by a Party involved in the project. Projects starting as from the year 2000 may be eligible as JI projects if they meet the relevant requirements, but ERUs may only be issued for a crediting period starting after the beginning of 2008.

The CDM, which is defined in Article 12 of the Kyoto Protocol, is the only mechanism open to Contracting Parties classified as industrialized and developing countries. Deemed as "Kyoto Surprise"⁶, the proposal of the CDM emerged late in the Conference of the parties. Three negotiations and consensus on the final text developed with unprecedented speed. The CDM is very much a creation of combination of Brazilian proposals concerning the Clean Development Fund (CDF) and various proposals concerning JI. The CDF was a compliance mechanism proposed by Brazil in a meeting of the Ad hoc Group on Berlin Mandate. Under the CDF proposal, parties who failed to comply with

their assigned emissions commitments in a given budget period (2001-2020) were penalized through a requirement to contribute to the CDF. The penalty was to be contributed to a "non-Annex I clean development fund" for use in funding climate change projects in developing countries in order to foster sustainable development. The negotiation in Kyoto could be characterized as a struggle that merged the US-backed proposals for project-based JI, and the proposals for CDF, which stress that "each party included in Annex I to the Convention shall meet its QELROs through domestic actions."⁷ Eventually, the CDM evolved into a mechanism for Annex I countries to gain emissions offsets to achieve their QELROs. Developing countries, however, highlight the CDM's function to assist them in promoting sustainable development, and see it as a new channel for financial assistance, investments, technology transfer, and promotion of equity.

Besides the ultimate objective – stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system – of the Convention, the

⁶ Raúl Estrada-Oyuela, 'Remarks on From Kyoto to Buenos Aires: Technology Transfer and Emissions Trading' (Speech delivered at a conference held at Columbia University, New York, 24 April 1998). See also Jacob Werkman, 'Unwrapping the Kyoto Surprise' (1998) 7(2) *Review of European Community and International Environmental Law* 147, 151.

⁷ See the negotiating text by the Chairman (NTC) (FCCC/AGBM/1997/3/Add.1 and Corr.1), dated 21 April 1997, prepared by the Chairman, with assistance from the Secretariat, is a comprehensive document reflecting all submissions made by Parties to date and structured in the form of a protocol, and without attribution to the Parties. Para.121.4.



CDM has two basic aims. The purposes of the CDM shall be to assist Parties not included in Annex I in achieving sustainable development and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.⁸ In brief, it works in the following way: it allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable Certified Emissions Reduction (CER) credits, each equivalent to one ton of CO₂, which can be counted towards meeting Kyoto targets.

The mechanism is the first global, environmental investment and credit scheme of its kind, providing a standardized emissions offset instrument, CER. It stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in the ways they meet their emission reduction or limitation targets. Industrialized countries pay for projects that cut or avoid emissions in developing countries and are awarded credits that can be used to meet their own emissions targets; the developing countries benefit from

free transfer of advanced technology and from foreign investment which are essential to sustainable development through implementing eligible CDM projects in their countries.

A CDM project must provide emission reductions that are additional to what would have occurred otherwise. The projects must qualify through a rigorous public registration and issuance process. Approval is given by the Designated National Authorities (DNA). Public funding for CDM project activities must not result in the diversion of official development assistance. The mechanism is overseen by the CDM Executive Board (EB), answerable ultimately to the countries that have ratified the Kyoto Protocol. Since the operational initiation of the CDM, more than 3,000 projects have been registered worldwide and it is estimated to produce CERs amounting to more than 2.7 billion tonnes of CO₂ equivalent in the first commitment period of the Kyoto Protocol.⁹ In recent years, China with its large carbon emission potential and favorable investment and legal environments has become the global CDM projects centre. Already today, CDM projects launched in China have been responsible for approximately 60 per cent of the total CERs produced under the scheme.¹⁰

⁸ *United Nations Framework Convention on Climate Change*, opened for signature 12 June 1992 (entered into force 21 March 1994). Text of the Convention is available at <http://unfccc.int/resource/docs/convkp/conveng.pdf> at 9 August 2011.

⁹ See CDM in Numbers, UNFCCC website <http://cdm.unfccc.int/Statistics/index.html> at 9 August 2011.

¹⁰ See CDM Statistics: CERs Issued by



ET, as set out in Article 17 of the Kyoto Protocol, establishes a system of emission rights trading whereby one Annex I country might directly purchase from another Annex I country some of its rights to emit GHGs. More than actual emissions units can be traded and sold under the Kyoto Protocol's emissions trading scheme. The basic emissions unit is based on reduction commitments. Parties with commitments under the Kyoto Protocol (Annex B Parties) have accepted targets for limiting or reducing emissions. These targets are expressed as levels of allowed emissions, or "assigned amounts", over the 2008-2012 commitment period. The allowed emissions are divided into "assigned amount units" (AAUs). The other units which may be transferred under the scheme, each equal to one tonne of CO₂, may be in various forms: a removal unit (RMU), which is on the basis of land use, land-use change and forestry (LULUCF) activities such as reforestation, an emission reduction unit (ERU) generated by a JI project or a certified emission reduction (CER) generated from a CDM project activity.

Emissions trading schemes (ETS) may be established as climate policy instruments at the national level and the regional level. Under such schemes, governments set emis-

sions obligations to be reached by the participating entities. The European Union ETS is the largest scheme in operation. European Union Allowances (EUAs) is materialization of the EU ETS quotas, and the tradable unit under the EU ETS. One EUA represents the right to emit 1 ton of CO₂.

Thus, a new commodity was created in the form of emission reductions or removals. Since carbon dioxide is the principal greenhouse gas, people speak simply of trading in carbon. Carbon is now tracked and traded like any other commodity. This is known as the "carbon market" and it has grown as a response to the Kyoto Protocol. Carbon trading, sometimes called emissions trading, is a market-based tool to limit GHG. It is defined as:

... purchase contracts whereby one party pays another party in return for GHG emissions reductions or for the right to release a given amount of GHG emissions that the buyer can use to meet its compliance – or corporate citizenship – objectives vis-à-vis climate change mitigation.¹¹

Host Party, UNFCCC
<http://cdm.unfccc.int/Statistics/Issuance/CERsIssuedByHostPartyPieChart.html> at 9 October 2011.

¹¹ Karan Capoor and Philippe Ambrosi, 'State and Trends of the Carbon Market 2007' (The World Bank 2007) 8
<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21319781~pagePK:64257043~piPK:437376~theSitePK:4607,00.html> at 9 August 2011.



Based on whether the involvement of an emission abatement project, carbon trading can be categorized into allowance-based transactions (or cap-and-trade schemes) and project-based transactions (or credit schemes). In the allowance-based transactions, the governing body begins by setting a total cap on emission allowances. Subsequently those allowances are allocated or auctioned off to individual regions, countries, or even firms. Members that do not have enough allowances to their emission must either make reductions or buy another member's spare allowances. Members with extra allowances can sell them or bank them for future use. AAUs under the Kyoto Protocol or EUAs under the EU ETS are examples of such schemes. These transactions may facilitate mandated participants to meet compliance requirements at the lowest possible cost. A project-based transaction may allow the buyer to purchase emission credits from a project that can verifiably demonstrate GHG emission reductions compared with the emissions that would have incurred anyways by funding pre-approved emissions reduction projects in other countries. ¹² The CDM and the JI mechanisms of the Kyoto Protocol, generating CERs and ERUs respectively are the most notable examples.

Also, the carbon markets can be categorized into compliance or non

compliance as well as mandatory or voluntary markets. Most carbon markets are mandatory because buyers largely participate in carbon trading due to carbon constraints at international, national or sub-national levels. On the other hand, some voluntary carbon markets, namely the Chicago Climate Exchange (CCX) in the USA¹³ and the New South Wales Greenhouse Gas Abatement Scheme in Australia were set up to help facilitate carbon offset transactions.


The carbon markets are central to the global effort to reduce GHG emissions. It is estimated that implementing all the carbon market proposals that are currently contemplated would result in global emission reductions of 7 Gt CO₂ by 2020.¹⁴ At today's secondary CER price, the market in 2020 would be worth €670bn.¹⁵ A carbon price of

¹³ It should be noted that the CCX was closed at the end of 2010. For more details, see below page 15.

¹⁴ Brinkman, Marcel and Fankhauser, Samuel and Irons, Ben and Weyers, Stephan (2009) The carbon market in 2020: volumes, prices and gains from trade. Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment, 11. Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment, London, UK.

¹⁵ Endre Tvinnereim, The Global Carbon Market in 2020 (Point Carbon) http://www.worldcommercereview.com/publications/article_pdf/109 at 9 December 2011.

¹² Ibid.



\$50 per ton would yield a market value of almost \$2 trillion in 2020.¹⁶ The EU ETS remains the engine of the carbon market and China is the largest CDM seller.

¹⁶ Ibid.



2. International Experiences and Implications for China

2.1 EU

The EU Emissions Trading System (EU ETS) is a cornerstone of the European Union's policy to combat climate change and its key tool for reducing industrial GHG emissions cost-effectively. It has allocated a market price to carbon emissions and proven the possibility of trade in GHG emissions. This flexibility ensures that emissions reduction occurs in a cost efficient way.


The aim of the EU ETS is to help EU Member States to achieve their commitments to limit or reduce GHG emissions in a cost-effective way. It is based on the "cap and trade" principle. This means there is a "cap", or limit, on the total amount of certain GHG that can be emitted by the factories, power plants and other installations in the system. Within this cap, companies receive emission allowances which they can sell to or buy from one another as required. The limit on the total number of allowances available ensures that they have a value. At the end of each year each company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the remaining allowances to cover its future needs or else sell them to another company that do not possess sufficient allowances. Allowing partici-

pating companies to trade emission allowances means that emission reductions can be achieved at lowest cost.

Being the first and biggest international scheme for the trading of GHG allowances, the ETS now operates in 30 European countries (the 27 EU Member States plus Iceland, Liechtenstein and Norway) and currently covers over 11,000 installations in the energy and industrial sectors which are collectively responsible for close to half of the EU's emissions of CO₂ and 40 per cent of its total GHG emissions.¹⁷ It covers CO₂ emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. In addition, nitrous oxide emissions from certain processes are covered. As of 2012, aviation will also be included in the EU ETS.

There have been three phases under the EU ETS so far. The EU ETS was launched on 1 January 2005. The first trading period has been

¹⁷ For more details, see website Emissions Trading Scheme (EU ETS) http://ec.europa.eu/clima/policies/ets/index_en.htm at December 2011.



running for three years to the end of 2007 and was a “learning by doing” phase to prepare for the crucial second trading period. The first trading period successfully established the free trading of emission allowances across the EU, putting in place the necessary infrastructure and developing a dynamic carbon market. The environmental benefit of the first phase may be limited due to excessive allocation of allowances in some Member States and sectors. This misallocation results from dependency on projections rather than data, as verified emissions data only became available under the EU ETS. When the publication of verified emissions data for 2005 highlighted this “over-allocation”, the market reacted as expected by lowering the market price of allowances. The availability of verified emissions data has allowed the Commission to ensure that the cap on national allocations under the second phase is set at a level that will result in real emission reductions.

The second trading period has begun on 1 January 2008 and runs for five years until the end of 2012. The importance of the second trading period stems from the fact that it coincides with the first commitment period of the Kyoto Protocol, during which the EU and other industrialized countries must meet their targets to limit or reduce GHG emissions. For the second trading period EU ETS emissions have been capped at around 6.5 per cent below 2005 levels in order to help en-

sure that the EU as a whole, and each Member State, delivers on their Kyoto commitments. By 31 December 2010 in the second phase, the Commission has adopted EU-wide rules, which were developed under a committee procedure. These rules fully harmonise allocations and thus ensure that all firms across the EU with the same or similar activities will be subject to the same rules. The rules would ensure that the allocation promotes carbon-efficient technologies as far as possible. The adopted rules provide that to the extent feasible, allocations are to be based on benchmarks, e.g. a number of allowances per quantity of historical output. Such rules reward operators that have taken early action to reduce GHGs, better reflecting the polluter pays principle and giving stronger incentives emissions reduction, as allocations would no longer depend on historical emissions. All allocations are to be determined before the start of the third trading period and no ex-post adjustments will be allowed.

In the first and second trading period under the scheme, Member States had to draw up national allocation plans (NAPs) which determine their total level of ETS emissions as well as the quantity of emission allowances for each installation in their countries. At the end of each year installations must surrender allowances equivalent to their emissions. Companies that do not require all allocated allowances can sell their excess allowances.




Those facing difficulties in keeping their emissions in line with their allowances have a choice between either taking measures to reduce their own emissions – such as investing in more efficient technology or using less carbon-intensive energy sources – or buying the extra allowances they need on the market. A combination of the two methods is possible. Such choices are likely to be determined by relative costs. In this way, emissions are reduced wherever it is most cost-effective to do so.

The first two trading periods have also shown that widely differing national methods for allocating allowances to installations threaten fair competition in the internal market. Furthermore, greater harmonization, clarification and refinement are needed with respect to the scope of the system, the access to credits from emission-reduction projects outside the EU, the conditions for linking the EU ETS to emissions trading systems elsewhere and the monitoring, verification and reporting requirements. While the great majority of allowances has been allocated free of charge to installations in the first and second trading periods, the Commission proposed that going forward, auctioning of allowances should become the basic principle for allocation.

As from the third trading period, there will be a single EU-wide cap and allowances will be allocated on the basis of harmonised rules. NAPs

will therefore not be needed any more. At the same time a series of important changes to the way the EU ETS works will take effect in order to strengthen the system. Auctioning of allowances will become the basic principle for allocation. It is estimated that at least half of the available allowances as of 2013 will be auctioned. Member States will be responsible for ensuring that the allowances given to them are auctioned. Each Member State has to decide whether it wants to develop its own auctioning infrastructure and platform or whether it wants to cooperate with other Member States to develop regional or EU-wide solutions. The distribution of the auctioning rights to Member States is largely based on emissions in phase one of the EU ETS, but a part of the rights will be redistributed from richer Member States to poorer ones in order to take account of the lower GDP per head and higher prospects for growth and emissions among the latter. In principle, any allowances remaining in the reserve shall be distributed to Member States for auctioning. The distribution key shall take into account the level to which installations in Member States have benefited from this reserve.

In addition, as from 2013, the scope of the ETS will be extended to other sectors and GHG. CO₂ emissions from petrochemicals, ammonia and aluminium will be included, as will N₂O emissions from the production of nitric, adipic and glycolic acid production and per-



fluorocarbons from the aluminium sector. The capture, transport and geological storage of all GHG emissions will also be covered.


This concerns the collection of duly substantiated and verified emissions data from installations that will only be covered by the EU ETS as from 2013, and the national lists of installations and the allocation to each one. Registries are standardised electronic databases ensuring the accurate accounting of the issuance, holding, transfer and cancellation of emission allowances. As a signatory to the Kyoto Protocol in its own right, the Community is also obliged to maintain a registry. This is the Community Registry, which is distinct from the registries of Member States. Allowances issued from 1 January 2013 onwards will be held in the Community registry instead of national registries.

The EU also passed legislation to establish a scheme for GHG allowance trading within the Community. Member States have to bring into force the legal instruments necessary to comply with the legislation. The relevant regulations in the legislation have been revised multiple times. When an international agreement is reached, the Commission shall submit a report to the European Parliament and the Council assessing the nature of the measures agreed upon in the international agreement and their implications, in particular with respect to the risk of carbon leakage. On the basis of this report, the Commis-

sion shall then adopt a legislative proposal amending the present Directive as appropriate. Moreover, the national laws, regulations and administrative provisions have to be ready. The Commission adopted a new Regulation governing the monitoring and reporting of emissions from the activities listed in Annex I of the Directive. A separate Regulation on the verification of emission reports and the accreditation of verifiers should specify conditions for accreditation, mutual recognition and cancellation of accreditation for verifiers, and for supervision and peer review as appropriate.

It is predicted that in 2020 emissions will be 21 per cent lower than in 2005 under the EU ETS.¹⁸ The success of the EU ETS has inspired other countries and regions to launch cap and trade schemes of their own. Furthermore, the Commission sees the EU ETS as an important building block for the development of a global network of emission trading systems. The EU hopes to link up the ETS with compatible systems around the world to form the backbone of a global carbon market. Linking other national or regional cap-and-trade emissions trading systems to the EU ETS can create a bigger market, potentially lowering the aggregate cost of reducing GHG emissions. The EU is keen to work with the new US Administration to build a transatlantic and indeed global car-

¹⁸ Ibid.



bon market to act as the motor of a concerted international push to combat climate change. The increased liquidity and reduced price volatility would improve the functioning of markets for emission allowances. This might lead to a global network of trading systems in which participants, including legal entities, are able to buy emission allowances in order to fulfil their respective reduction commitments.

In spite of this achievement, there are some people and organizations, which have responded differently to the EU ETS. First, the EU ETS needed to be supported by other policies for technology and renewable energy. Technology policy is necessary to overcome market failures associated with delivering low-carbon technologies, e.g., by supporting research and development.¹⁹

Second, the EU ETS has been criticized for several failings, including: over-allocation, windfall profits, price volatility, and in general for failing to meet its goals.²⁰ In addition,

¹⁹ *Building a low-carbon economy – The UK's contribution to tackling climate change*. The First Report of the Committee on Climate Change. 155, <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf> at 20 December 2011.

²⁰ EU Emissions Trading System: Failing at the third attempt, Corporate Europe Observatory/Carbon Trade Watch, April 2011, <http://www.corporateeurope.org/news/e>

the EU ETS has been criticized as having caused a disruptive spike in energy prices.²¹ They say that it does not correlate with the price of permits, and in fact the largest price increase occurred at a time (Mar-Dec 2007) when the cost of permits was negligible.²²

Third, there was an oversupply of emissions allowances for EU ETS Phase I. This drove the carbon price down to zero in 2007.²³ This oversupply reflects the difficulty in predicting future emissions but which is necessary in setting a cap. Given the poor data about emissions baselines, inherent uncertainty of emissions forecasts, and the very modest reduction goals of the Phase I cap (1-2 per cent across the EU), it was entirely expected that the cap might be set too high.²⁴

Fourth, there are some concerns that the EU ETS brings about crime. In 2009 Europol informed that 90

u-ets-failing-third-attempt at 20 December 2011.

²¹ Steven Mufson, *Europe's Problems Color U.S. Plans to Curb Carbon Gases*, *The Washington Post*, April, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/04/08/AR2007040800758_pf.html at 20 December 2011.

²² A. Denny Ellerman and Paul L. Joskow, *The European Union's Emissions Trading System in Perspective*, (Pew Centre on Global Climate Change 2008) <http://www.c2es.org/docUploads/EU-ETS-In-Perspective-Report.pdf> at 20 December 2011.

²³ Above n 19, 140.

²⁴ Ellerman and Joskow, above n 22.

per cent market volume of emissions traded in some countries could be the result of tax fraud, more specifically missing trader fraud, costing governments more than €5 billion.²⁵ German prosecutors confirmed in March 2011 that value-added-tax fraud in the trade of carbon-dioxide emissions has deprived the German state of about €850 million (\$1.19 billion). In December 2011 a German court sentenced six men to jail terms of between three years and seven years and 10 months in a trial involving evasion of taxes on carbon permits. A French court sentenced five people to one to five years in jail, and to pay massive fines for evading tax through carbon trading. In the UK a first trial over VAT fraud in the carbon market is put on track to start in February 2012. Cyber fraudsters have also attacked the EU ETS with a "phishing" scam which cost one company €1.5 million.²⁶ In response to this, the EU has revised the ETS rules to combat crime.²⁷

²⁵ Leigh Phillips, "EU emissions trading an 'open door' for crime, Europol says" (2009-12-10). EU Observer, <http://euobserver.com/885/29132> at 20 December, 2011.

²⁶ Leigh Phillips, "Cyber-scam artists disrupt emissions trading across EU" (2010-02-03). EU Observer, <http://euobserver.com/885/29403> at 20 December 2011.

²⁷ "EU approves revised ETS rules to combat cyber crime" (2009-10-01), Euractive, <http://www.euractiv.com/climate-environment/eu-approves-revised-ets->


Fifth, there are some shortcomings of the use of offset credits. The EU ETS allows the use of offset credits from JI and CDM projects. The main advantage of allowing free trading of credits is that it allows mitigation to be done at least-cost. In terms of the UK's climate change policy²⁸, noted three arguments against too great a reliance on credits:

- Rich countries need to demonstrate that a low-carbon economy is possible and compatible with economic prosperity. This is in order to convince developing countries to lower their emissions. Additionally, domestic action by rich countries drives investment towards a low-carbon economy.
- An ambitious long-term target to reduce emissions, e.g., an 80 per cent cut in UK emissions by 2050, requires significant domestic progress by 2020 and 2030 to reduce emissions.
- CDM credits are inherently less robust than a cap and trade system, where reductions are required in total emissions.

Moreover, it has been argued that the volume of CDM/JI credits, if carried over from phase II (2008–2012 to phase III 2013–2020) in the EU ETS will undermine its environ-

rules-combat-cyber-crime-news-260461 at 20 December 2011.

²⁸ Above n 19.



mental effectiveness, despite the requirement of supplementary in the Kyoto Protocol.²⁹

The success and criticism of the EU ETS could have implications for the design of the Chinese ETS. There are other lessons and experience to be learnt from the EU ETS first trading period, such as:


the EU's adoption of the cap and trade approach to emissions control makes it the preferred approach for other countries wishing to eventually trade emission permits beyond their own borders;

- adequate preparation time is essential to implement a well designed emissions trading scheme;
- a well informed trading market requires verifiable emissions data being available before emissions trading commences;
- maintaining the relative scarcity of emission permits requires unlimited banking of unused permits together with no forfeiture of those permits should a particular emitting facility close down;

the initial allocation of emission permits is also vital to maintain the relative scarcity of emission per-

mits. The main lesson from the European experience is that this decision should be separate from either sectoral or state influence; the relative scarcity of emission permits in a cap and trade system must be maintained if an emissions market is to meet its overall objectives. This constitutes the primary principle and should also be a lesson applied to any Chinese ETS.

²⁹ "The EU ETS, CDM and the Carbon Market", Mission of Thailand to the EC (2009), http://www.thaieurope.net/ftp/project09/ETS_final.pdf at 20 December 2011.



2.2 US

The US has also used market-based instruments to reduce emissions, which include, but is not limited to, Regional Greenhouse Gas Initiative (RGGI), Global Warming Solutions Act of 2006 and the Chicago Climate Exchange (CCX). With the introduction of a GHG cap-and-trade scheme in the US, global carbon markets could be worth almost EU2 trillion (USD \$3.1 trillion), with total transaction volume forecast at 38 billion tonnes carbon dioxide equivalent (Gt CO₂e) per year by 2020, according to Point Carbon. According to the estimates, some 67 per cent of this EU2 trillion (USD \$3.1 trillion), equivalent to EU1.25 trillion (USD \$2.3 trillion), would be traded within a US ETS while the second largest ETS, the EU scheme, would trade 9 Gt CO₂e, equivalent to 23 per cent of the global market.³⁰ This is, Point Carbon believes, a possible scenario given that the two main market segments by volume - the US and EU - have already formulated quite specific proposals for how they will trade carbon in twelve years' time. Therefore, the US ETS is expected to play an indispensable role in the global carbon market and it is necessary to review its experience and practice.

³⁰ The figures, released in Point Carbon's Carbon Market Analyst, entitled "Carbon Market Transactions in 2020: Dominated by Financials?," (2008)

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort by ten Northeast and Mid-Atlantic States of the US to reduce CO₂ emissions from electricity generating plants. In the US, RGGI, a multi-state emissions cap and trade program with a market-based emissions trading system, is the first program of its kind. The cap and trade program is designed to reduce CO₂ while maintaining the affordability and reliability of electricity. The program also directly funds energy efficiency and cleaner energy programs that will lower GHG emissions.

In the absence of federal action on climate change, a group of Northeastern states began to fashion a collective regional response in 2003. In August 2005, the RGGI staff working group proposed an emissions reduction program that would start in 2009 and lead to a stabilization of emissions at current levels (an average of 2002-2004 levels) by 2015. This would be followed by a 10 per cent reduction in emissions between 2015 and 2020. The proposal would also allow participants to purchase offsets to meet 50 per cent of their emission reductions. This effort is known as the RGGI and represents an unprecedented joint approach by a regional coalition of states to combat global warming. As of December 20, 2005,



seven Northeastern US states were involved in the RGGI. The seven states involved (Delaware, New Jersey, New York, Connecticut, Vermont, New Hampshire and Maine) signed a "Memorandum of Understanding" (MOU) committing themselves to move forward with the program. Massachusetts and Rhode Island both joined RGGI in early 2007, and Maryland joined in April 2007. The MOU commits states to invest 25 per cent of revenue from carbon credits to energy efficiency and strategic energy schemes. This revenue is generated by auctioning credits from the state budget to compliance entities. Since signing the MOU in 2005, all ten states have committed in their Model Rule to the sale of the vast majority of the state's carbon budget.


RGGI's goal is to reduce CO2 emissions from power plants in participating states through a mandatory cap-and-trade program. Each RGGI participant state must enact agreed-on rules, by way of state legislation or administrative regulations, in order to implement the program. The program caps GHG emissions in 10 states in the northeast and allocates the right to emit through the auction of allowances. The program's first three-year compliance period begun on January 1, 2009 and ends on December 31, 2011. Emission permit auctioning began in September 2008. Proceeds are used to promote energy conservation and renewable energy.

A parallel effort to reduce emissions in the Northeast can be seen in the New England Governors/Eastern Canadian Premiers Climate Change Action Plan³¹, which calls for a reduction in GHG emissions to 10 per cent below 1990 levels by 2020. For comparison: the EU aims to reduce emissions to 20 per cent below 1990 levels by 2020 and is deliberating to increase this reduction aim to 30 per cent. In addition, the Northeast States for Coordinated Air Use Management is building a Regional Greenhouse Gas Registry (RGGR) to help track emissions in the region. This effort is similar to that of the California Climate Action Registry.

In 2012, the RGGI will aim to build upon the success of its first three-year compliance period and make key improvements as it enters its second three-year compliance period. In an effort to strengthen the existing initiative design and achieve desired emission reductions, RGGI states are retiring allowances not sold in the first phase, increasing the reserve price of allowances, conducting a comprehensive review, and considering a reduction to the number of available allowances to ensure further emission cuts.

On January 17, 2012, RGGI member states announced several actions to reduce the number of available emission allowances. First,

³¹ The text of the plan is available at http://www.iclei.org/documents/USA/NEG-ECP_CCAP.PDF at 20 December 2011.



auctions in 2012 will only offer allowances for 2012 and none from the next compliance period (2015 to 2017). Second, at least five states (Connecticut, Delaware, Massachusetts, New York, Rhode Island, and Vermont) agreed to retire unsold allowances from the first compliance period, which could otherwise have been used in later compliance periods. With fewer total allowances available for auction, cumulative emissions will decline. Many states have faced an oversupply of allowances as emissions from power plants are approximately 30 per cent less than the cap, due in part to the economic recession and investment in natural gas and renewable electricity generation.

Beyond withholding future compliance period allowances and retiring unsold allowances, RGGI may also consider additional measures to increase the market pressure on electricity generators to reduce carbon emissions. Tightening annual emission caps may be an additional option identified by RGGI's first mandated program review, which will be completed in summer 2012.


The economic benefits from RGGI's first compliance period were significant. An Analysis Group report³² released in November 2011 estimated that RGGI produced \$1.6

billion in economic value for its member states between 2009 and 2011. The proceeds from sales of RGGI allowances have funded energy efficiency improvement programs, community-based renewable energy projects, assistance to low-income customers, education and job training programs, and general budget funds of the states.

The State of California not only leads the nation in energy efficiency standards and plays a lead role in environmental protection, but is also one of the large emitters of carbon worldwide. In 2006, California became the first state in the US to create a legally binding program to limit GHG emissions. The Global Warming Solutions Act of 2006, or Assembly Bill (AB) 32, resembles an exceptional legislative example of addressing climate change and carbon emissions. It is a California State Law that fights climate change by establishing a comprehensive program to reduce GHG emissions to 1990 levels by 2020 by considering all sources throughout the state.

GHG emissions are defined in the bill to include all of the following: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons. These are the same GHGs listed in Annex A of the Kyoto Protocol. The Act left substantial discretion to the California Air Resources Board (CARB), the California Energy Commission (CEC), the Public Utilities Commission (CEC) as well as other

³² The text of the plan is available at http://www.iclei.org/documents/USA/NEG-ECP_CCAP.PDF at 20 December 2011.



state agencies. It requires the California Air Resources Board to develop regulations and market mechanisms to reduce California's GHG emissions to 1990 levels by 2020, representing a 25per cent reduction statewide, with mandatory caps beginning in 2012 for significant emissions sources. The bill enables the Governor to suspend the emissions caps for up to one year in the case of an emergency or significant economic harm.

On December 17, 2010 AB 32 adopted a cap-and-trade program to place an upper limit on statewide GHG emissions. This is the first program of its kind in the US and will take effect in the beginning of 2012. It will include an emission limit which will be reduced by two percent each year through 2015 and three percent each year from 2015 to 2020. First the rules will apply to utilities and large industrial plants, and in 2015 will begin to be applied to fuel distributors as well, eventually totalling 360 businesses at 600 locations throughout the State of California. Free credits will be distributed to businesses that account for about 90 percent of overall emissions in their sector. Additional emissions have to be accounted for through either the purchase of allowances or credits. Offsets - actions, such as the planting of trees, that absorb greenhouse gases, can also be drawn upon in order to account for up to 8 percent of emissions.

California is also key to the Western Climate Initiative, the west's answer to RGGI, which aims "to design a regional cap-and-trade program that can deliver GHG emission reductions within the region at costs lower than could be realized through a California-only program." In the meantime, California will become the country's testing ground for cap-and-trade policy.

The now defunct Chicago Climate Exchange (CCX) was North America's only voluntary, legally binding GHG reduction and trading system for emission sources and offset projects in North America and Brazil. Although participation is voluntary, compliance with emission reduction objectives is legally binding once a member joins. Members who cannot achieve the reduction target through reducing their emissions internally can meet their compliance commitment by purchasing emission allowances (called Carbon Financial Instruments; CFI) through CCX's electronic trading platform from other CCX Members that reduce their emissions beyond the reduction target. Offsets from projects implemented through the CCX offset program can also be used to meet reduction targets. Total use of offsets for compliance is limited to no more that one half of the required reductions.

CCX started trading in October 2003, prior to the commencement of trading in the EU through the ETS system. Until July 2010, CCX

was operated by the public company Climate Exchange PLC. The exchange trades in emissions of six gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbons and hydrofluorocarbons.

The Trading System had the following three parts.

1. The Trading Platform was a market place for executing trades among Registry Account Holders.
2. The Clearing and Settlement Platform processed all transaction information.
3. The Registry was the official database for Carbon Financial Instruments owned by Registry Account Holders.

The exchange had more than 400 members ranging from corporations like Ford, DuPont, and Motorola, to state and municipalities such as Oakland and Chicago, to educational institutions such as University of California, San Diego, Tufts University, Michigan State University and University of Minnesota, to farmers and their organizations, such as the National Farmers Union and the Iowa Farm Bureau.³³ CCX says

³³ See Participants of Chicago Climate Exchange, http://en.wikipedia.org/wiki/Chicago_Climate_Exchange#cite_note-10#cite_note-10, at 20 December 2011. See also CCX Membership List

its 450 members achieved reductions of 700 million tons of GHG emissions over the seven-year life of the cap-and-trade program. 88 percent of the reductions were achieved through direct industrial emission cuts and 12 per cent through offsetting.³⁴

The Administrative Bodies of CCX include:

CCX Committee on Offsets is responsible for reviewing and approving proposed offset projects.


External Advisory Board provides external strategic input to the CCX team and includes experts from the environmental, business, academic and policy-making communities.

Technical Advisory Committees are established by request of each CCX standing committee or on an ad-hoc basis. These technical committees are usually comprised of outside experts.

The CCX Committee on Forestry is responsible, among other things,

<http://chicagoclimatex.com/content.jsf?id=64>

³⁴ **Nathaniel Gronewold, Chicago Climate Exchange closes nation's first cap-and-trade system but keeps eye to the future (2011-1-3), E&E Publishing**
<http://www.eenews.net/public/climatewire/2011/01/03/2> at 20 December 2011.



for reviewing proposed forestry offset projects.

The CCX Regulatory Services Provider is the Financial Industry Regulatory Authority (FINRA), the largest nongovernmental regulator for all securities firms doing business in the United States. It provides external verification of the baseline, annual emissions report of each member, monitors CCX trading activity and reviews verifiers' reports for offset projects.

Third-party Offset Project Auditors are called 'verifiers' and are approved by CCX for each project type to verify an offset project's annual GHG sequestration or destruction. There are currently 29 approved auditors (12/07).

Financing of the Standard Organisation. Financials of Climate Exchange, including CCX, are available to the public. The operations and management of the exchange is financed primarily through trading and offset registration fees as well as through enrolment and annual fees generated from its members.

Due to a lack of legislative interest, CCX, a pilot program for the trading of GHGs in the US, shut down. Emissions trading, also known as cap and trade, effectively ended in the US when climate legislation died in the Senate. But it's still going strong overseas. CCX was a pioneer in establishing a cap-and-trade sys-


tem. It was the first such system established in North America and it has given companies the opportunity to learn and gain experience with emissions reduction commitments and carbon trading. Despite these very positive aspects of CCX, there have been several points of criticism of CCX in general and of CCX's offset program in specific.³⁵

First, CCX neither requires a local stakeholder consultation process and nor does it focus on enhancing cobenefits. CCX would not be a sufficient standard for buyers who place value on these co-benefits.

Second, there has been significant criticism of the lack of additionality of some CCX offsets. It undermines the environmental integrity of offsets: if non-additional credits enter a cap-and-trade system, emissions are actually increasing because the buyer of the non-additional offsets will continue to emit whilst no further emissions reductions are achieved through the offset projects.

Third, it is true that additionality raises an equity issue: individuals who have acted as pioneers and have already been engaged in non-traditional low-carbon practices will not be able to sell their carbon credits because their actions are by

³⁵ WWF Germany, March 2008, Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards, Anja Kollmuss (SEI-US), Helge Zink (Tricorona), Clifford Polycarp (SEI-US).



definition non-additional (they happened for other reasons than the carbon offset market). In order to preserve the environmental integrity of the broader offsets market, the fairness concern would need to be addressed via measures other than handing out non-additional carbon credits (e.g. early action provisions, tax/subsidy treatment, discounting of credits, etc).

Fourth, several groups have in the past criticized CCX for its general lack of transparency.³⁶ CCX has responded to this criticism by making its rule book and many of the methodologies available on its website. This increase in transparency will enable a more independent evaluation of project methodologies.

Finally, companies who voluntarily signed on to CCX are a self-selecting subset of corporations who are likely to be confident that they can comply or even over-comply with the commitments. It is therefore difficult to assess the achievements of the CCX per se. The very low prices of CFIs indicate that many of the member companies of CCX have over-complied with their commitments and, conversely, that the CCX targets are not stringent enough to exert any

pressure above and beyond the companies' expected emission levels. If the cap in a cap-and-trade system is low and there is over-compliance, the cap may not be leading to any reductions beyond business as-usual. There is a risk that carbon offsets from unspecified CFIs do not actually lead to emissions reductions beyond business-as-usual.

Although the nation's first experiment in carbon emissions cap and trade ended, its impact on the climate change industry will be felt for some time to come. Meanwhile, CCX's sister institutions, the European Climate Exchange and the Chicago Climate Futures Exchange, will continue if there is corporate and state government interest in fighting climate change, even with the failure of cap and trade in the US Congress. In addition, California's recent move toward mandatory emissions trading is reviving the market. RGGI officials are also in talks to reform their system. And CCX officials state that although they've closed their contractually binding trading platform, they aim to leverage their relationship with some of the nation's largest companies to revitalize the voluntary carbon market, while maintaining their dominant position as the largest host of trading in a variety of environmental commodities.

³⁶ Dale S. Bryk. (2006). 'States and Cities Should Not Join the Chicago Climate Exchange.' Natural Resources Defense Council, http://www.hawaiienergypolicy.hawaii.edu/PDF/2007/Appendix_I.pdf at 20 December 2011.



2.3 Other Countries

The success of the EU ETS has inspired other countries and regions to launch cap and trade schemes of their own. Australia also endeavours to take market-based initiatives in response to the challenge of climate change. However, in Australia the introduction of such initiatives is confronted with obstacles.

The Australian ETS was set to come into effect in 2010, but that introduction time has been delayed by years. The main reason can be seen in the expected increase of electricity, transport and fuel costs due to the introduction of carbon pricing. The Carbon Pollution Reduction Scheme (CPRS) was a proposed cap-and-trade system of emissions trading for anthropogenic GHGs, due to be introduced in Australia in 2010 by the Rudd government, as part of its climate change policy. It marked a major change in the energy policy of Australia.

The basis of a CPRS was a cap and trade system, and presented a way of limiting GHGs emissions, as well as giving individuals and businesses incentives to reduce their emissions. The Australian Government would have set a cap on carbon emissions, consistent with longer term goals of reducing Australia's emissions by 60 per cent compared with 2000 levels by 2050. The objective of the

CPRS was to meet Australia's emissions reduction targets in the most flexible and cost-effective way; to support an effective global response to climate change; and to provide for transitional assistance for the most affected households and firms. The main concern for the Australian Government was seen in the correct design of such a scheme, so that it would have complemented the integrated economic policy framework, and would have been consistent with the Government's commercial strategy.

The final version of the now defunct Australian CPRS was, in effect a hybrid scheme, whose main structure was cap-and-trade, but with set limits on the price of an emissions permit in its initial years and unlimited acceptance of certain types of Kyoto Protocol emissions credits. However, the legislation for the CPRS failed to gain adequate support and was rejected twice. After a while, the CPRS idea was dubbed "a great big new tax". The Rudd government did not call an election and the CPRS lost public support. In April 2010, Labor then deferred the CPRS. A carbon tax is a tax on energy sources which emit CO₂. It is a pollution tax, which some economists favour because they tax a "bad" rather than a "good" (such as income). Carbon

taxes address a negative externality. Externalities arise when an individual production or consumption activity imposes costs or benefits on a 3rd party. In market transactions, these costs and benefits are not normally reflected in the prices involved in the transaction, or taken into account in the transaction decision.

By placing a cost on these negative externalities the underlying purpose of a carbon tax is to reduce emissions of CO₂ and thereby slow global warming. It can be implemented by taxing the burning of fossil fuels—coal, petroleum products such as petrol and aviation fuel, and natural gas—in proportion to their carbon content.

There is some political support for a carbon tax in Australia as a means of implementing a carbon price. Some groups favour this approach as an interim step on the way to an Australian emissions trading scheme. The Garnaut Climate Change Review, rejected carbon taxes in favour of an emissions trading scheme.

Australia's parliament passed its landmark laws to allocate a market price on carbon emissions, ensuring the start of a carbon tax on July 1, 2012, ahead of a full emissions trade scheme from mid-2015. The Clean Energy Legislative Package includes four main bills:

- the Clean Energy Bill 2011

- the Clean Energy Regulator Bill 2011
- the Climate Change Authority Bill 2011
- the Clean Energy (Consequential Amendments) Bill 2011.

Following the recent passage of the Clean Energy Legislative Package, Australia has become example for many of the key players in the global carbon market, particularly those in Europe and the UK whose own carbon market continues to suffer from apparent over supply. Furthermore, it works towards linking Australia's carbon market with the EU scheme.

The carbon price is a central policy of Prime Minister Julia Gillard, who is struggling in the polls and who has staked her government's future on a plan to price carbon emissions from Australia's top 500 polluting companies. The carbon price is the key measure to help Australia, which accounts for 1.5 percent of global emissions, reach its target to curb emissions by five percent by 2020, based on year 2000 levels. The Australian ETS would have forced up the price of emissions intensive products like coal-fired power, gas and possibly petrol and beef thus encouraging people to use less. But actually, it wouldn't have discouraged consumption but rather forced consumers to pay higher prices.

Essentially, the ETS is embodied by the government selling permits that give the owners of the permits the



right to emit a tonne of carbon. For the first 3-5 years, there will be an unlimited amount of carbon permits sold at a fixed price (price yet to be released). This effectively acts as a tax. After 3-5 years, the government will move from unlimited release of permits to auctioning a lim-

ited number of permits. The permits are sold to the highest bidders, who can then use them to emit carbon or on-sell them to other parties. The price of carbon will vary depending on demand for emissions and the amount of permits auctioned of each year by government.

3. Necessity of CO2 ETS in China

3.1 Internal Pressures: Unsustainable Development

Climate change has a different impact on different countries due to their different national circumstances.³⁷ China has the following basic national circumstances:

(1) Physical features and administrative divisions of China

China, located in eastern Asia on the western shores of the Pacific Ocean, is the third largest country in the world by area after Russia and Canada, with 9.6 million square kilometres in total. China's coasts are on the East China Sea, Korea Bay, Yellow Sea, and South China Sea. The country has a continental coastline extending over 18,000 kilometres and an adjacent sea area of 4.73 million square kilometres.³⁸

The terrain of China contains a large variety of landscapes. In the East, there are extensive and densely populated alluvial plains,

while in the North, grasslands dominate the landscape. China's grassland area for 2005 was 400 million hectares, most of which are high-cold prairie and desert steppe, while the temperate grasslands in northern China are on the verge of degradation and desertification, because of drought and environmental deterioration.³⁹ Southern China is dominated by hill countries and low mountain ranges. The central East possesses the deltas of China's two major rivers, the Yellow River and Yangtze River (Chang Jiang). The western part of China mostly consists of mountains, notably the Himalayas, high plateaus and deserts. For 2005, China's total area of desertification was 2.63 million square kilometres, accounting for 27.4 per cent of the country's territory;⁴⁰ arable land in China, however, only accounts for 14.86 per cent.⁴¹ In addition, the national forest area for 2005 was 175 million hectares, and the coverage rate was just 18.21 per cent.⁴²

³⁷ This part is adapted from Xiaoyi Jiang, *Legal Issues for Implementing the Clean Development Mechanism in China*, (Springer: Berlin), 2012.

³⁸ National Development and Reform Commission, People's Republic of China, *China's National Climate Change Programme* (2007) 15 www.ccchina.gov.cn/WebSite/CCChina/UFile/File188.pdf at 9 August 2011.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ See *The World Factbook* (2008) Central Intelligence Agency, <https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html> at 10 August 2011.

⁴² Above n 38, 15.



China has administrative control over twenty-three provinces, including Taiwan Province. There are also five autonomous regions, which have traditionally been referred to as Outer China, because they are located beyond the Great Wall of China. Four municipalities, including Beijing (Capital of China), Shanghai, Chongqing and Tianjin; and two Special Administrative Regions enjoy considerable autonomy. The twenty-two provinces, five autonomous regions and four municipalities can be collectively referred to as mainland China, a term which usually excludes Taiwan, Hong Kong and Macau.

(2) Population in China

China has the largest population in the world. In 2005, the population of China's mainland was 1.31 billion, accounting for 20.4 per cent of the world population.⁴³ In spite of the large population, excessive population growth trend has been under effective control since the One Child Policy was introduced by the Chinese government in 1982 as a basic national policy.

Along with industrialization, an urbanization movement is taking place in China: the urban population accounted for only 26.4 per cent in 1990, and increased to 43 per cent in 2005.⁴⁴ However, China is still at a low level of urbanization,

⁴³ Ibid.

⁴⁴ Ibid.

with 750 million people living in rural areas, and urban population accounting for 43 per cent of the national population being lower than the world average.⁴⁵

Consequently, huge population and urbanization movements bring about huge employment pressure for China, with annually more than 10 million new workers in urban areas and about 10 million new rural workers moving to urban areas.⁴⁶

(3) Economic development in China

China's economy has been developing rapidly since the Reform and Opening up Policy⁴⁷, which was proposed by Xiaoping Deng in 1978. As a consequence, living standards in China has been improved dramatically. Although great economic changes have taken place, China is currently at a relatively low level of economic development. In 2005, the per capita Gross Domestic Product (GDP) of China was about US\$ 1,714 (based on exchange rate of the same year, the same below),

⁴⁵ The data was issued in 2001. See Chinese Cities and Provinces Information and Links, A China Information Base <http://www.chinatoday.com/city/a.htm> at 10 August 2011.

⁴⁶ Above n 38, 15.

⁴⁷ The economy has changed from a centrally planned system that is under a rigid political control to a more market-oriented economy that has a rapidly growing private sector and is a major player in the global economy.

only about one-fourth of the world average.⁴⁸

Remarkable disparity in economic development exists among different regions of China. In 2005, the per capita GDP of the eastern areas of China was US\$ 2,877, while that of the western areas was US\$ 1,136, only 39.5 per cent of the former. Especially, Shanghai in the eastern areas is experiencing fast economic development. According to international standards on statistics, the per capita GDP in Shanghai in 2006 was over US\$7,000.⁴⁹

The income disparity between rural and urban residents is also significant. In 2005, the per capita disposable income of the urban residents was US\$ 1,281, while that of the rural residents was only US\$ 397, equivalent to 31.0 per cent of the former.⁵⁰ Furthermore, poverty eradication is still a huge challenge for China. By the end of 2005, the poverty-stricken people in China's rural areas numbered 23.65 million, with the per capita annual pure income less than 683 Chinese Yuan (less than US\$ 100).⁵¹

(4) Climatic conditions in China

⁴⁸ Above n 38, 16.

⁴⁹ This is according to the news conference held by the Information Office of Shanghai Municipal Government on February 7 2007.

⁵⁰ Above n 38, 16.


¹⁶ Ibid.

The climate of China is extremely diverse, with tropical areas in the South, to subarctic areas in the North, adding to China's extensive territory and complex topography. The northern zone (containing Beijing) has summer daytime temperatures of more than 30 degrees Celsius and winters of arctic severity, with the lowest temperature of minus 30 degrees Celsius in northernmost Heilongjiang province. The central zone (containing Shanghai) has a temperate continental climate, with very hot summer and cold winter. There are also the famous Three Ovens cities along the Yangtze River in summer: Chongqing, Wuhan, and Nanjing. The summer temperature in these cities may reach up to 40 degrees Celsius. The southern zone (containing Guangzhou) has a subtropical climate, with very hot summer and mild winter.

Moreover, most parts of China have a continental monsoon climate, with more drastic seasonal temperature variations. As a result, the temperature in China in the winter is 5 to 18 degrees Celsius lower compared to other areas on the same latitude, such as North America and West Europe.⁵²

Precipitation in China varies regionally even more than temperature.

⁵² See General Information of the People's Republic of China (PRC), A China Information Base <http://www.chinatoday.com/general/a.htm> at 10 August 2011.



Annual precipitation gradually declines from the southeastern coastal areas, with as high as 1,500 millimeters to the northwestern inland areas, with less than 50 millimeters.⁵³ From a seasonal point of view, most of the precipitation occurs in summer, mainly from May to September. Hence, the unevenly seasonal and spatial distribution of precipitation in China may cause floods in South China and droughts in North China. Besides, China experiences frequent meteorological disasters, such as typhoons, monsoons, tsunamis, etc., which are unusual worldwide in terms of the gravity of disaster, the scope of affected areas, and the mass of affected population.

(5) Air quality in China

Air quality in China is poor. Although the trend of worsening air quality in the cities in China has slowed, the overall pollution level remains high.⁵⁴ According to the 2006 China Environmental Quality Communique, 62.4 per cent of the monitored cities have met the national air quality standard of Grade II, and 37.6 per cent are worse than Grade II. Fifty-one cities featured air quality worse than Grade

III, accounting for 9.1 per cent of the total monitored cities.⁵⁵

Air pollution leads to acid rain.⁵⁶ China is one of the countries in the world suffering from severe acid rain contamination, which brings many hazards to the environment, affects the standard of living, and is even harmful to human health. Central, South, Southwest and East China are the regions with serious acid rain impacts.

In conclusion, it can be clearly seen that, first, China is vulnerable to the impacts of sea level rise, because China has a long continental coastline, and most of the relatively developed cities in China, including Shanghai, are along the continental coastline. Second, despite the huge territory, China still has a vulnerable ecosystem due to the lack of arable land and forest as well as the expansion of deserts. Third, China is facing the challenge of reducing employment pressure caused by a large population and increasing urbanization. Fourth, the priority for China at this stage is reducing poverty and developing its economy. Both goals require more energy and will inevitably lead to increased carbon emissions. Fifth, China has relatively harsh climatic

⁵³ Ibid.

⁵⁴ This is according to *China Environmental Quality Communiques 1996-2008* released by Ministry of Environmental Protection of the People's Republic of China <http://jcs.mep.gov.cn/hjzl/zkgb/> at 8 August 2011.

⁵⁵ *China Environmental Quality Communiques – Air Quality 2006* http://jcs.mep.gov.cn/hjzl/zkgb/06hjzkgb/200706/t20070619_105423.htm at 8 August 2011.

⁵⁶ Acid rain is caused mainly by SO₂ and NO_x from burning coal and oil.

conditions, and thus, inhabitants use more energy in order to maintain a relatively comfortable room temperature. Finally, air pollution in China is serious, and more efforts are needed to improve air quality. Therefore, China is under considerable pressure to reduce emissions without undermining its economic development.

Demand and supply of energy are affected by economic growth and structural change of economic sectors. China has had a very high economic growth rate since the Economic Reform and the Opening Up policy was proposed.⁵⁷ Its annual GDP growth rate has remained appropriately 10 per cent in the consecutive eight years during the period of 2003-2010.⁵⁸ In particular, the amount of GDP in 2007 reached 2.47 billion Yuan, with 11.4 per cent growth rate.⁵⁹ Moreover, it is

⁵⁷ It refers to the program of economic reforms called 'Socialism with Chinese characteristics' in the People's Republic of China (PRC) that were started in December 1978 by pragmatists within the Communist Party of China (CPC) led by Deng Xiaoping and are ongoing as of the early 21st century. The goal of Chinese economic reform was to generate sufficient surplus value to finance the modernization of the mainland Chinese economy.

http://en.wikipedia.org/wiki/Economic_reform_in_the_People's_Republic_of_China at 10 August 2011.

⁵⁸ See Chinability

<http://www.chinability.com/GDP.htm> at 10 August 2011.

⁵⁹ See the primary accounting of China's National Statistics Bureau

predicted that the high growth momentum will remain in the 21st century.⁶⁰


While China astonishes the world with its rapid economic development, energy problems emerge as to how it will fuel its future economic growth. China will certainly require more energy.

First, China needs more electricity to advance industry development, and maintain its living standards. Although the industrial structure has been improved through a series of policies, with an aim of accelerating the development of tertiary industries and restructuring secondary industries, the ratio of secondary industry is still too high and tertiary industry remains seriously lower compared to developed countries. The National Bureau of Statistics of China indicates the breakdown of GDP across the primary, secondary and tertiary industry in 2007 was 11.7 to 49.2 to 39.1, while in developed countries it is less than 5 to less than 30 to more than 65.⁶¹ In this scenario, on the one hand, great efforts should be made to optimize the industry structure; on the other hand, more electricity and raw materials are needed as secondary industries still dominate. Furthermore, as the people's living conditions increasingly improve and urbanization

<http://www.stats.gov.cn/english/> at 10 August 2011.

⁶⁰ Ibid.

⁶¹ Ibid.



speeds up, more electricity is required to cater for people's living standards.

In addition, China's transportation sector is developing rapidly. In the early 1980s, it was very rare to own a private car in China. This situation has changed. With the development of China's economy, the middle-class is emerging and growing in China. Thus, rising incomes make private cars more affordable to the middle-class. According to the report of China National Statistics Bureau, by 2001, China had 7.71 million private cars, a number which may increase strongly to 140 million by 2020.⁶² Under this scenario, transportation fuel consumption would incur a massive increase in demand for energy and energy-related carbon emissions.

Facing this situation, China's energy structure is examined in order to identify the sources for energy to meet the demand of such a phenomenal economic growth.

China is endowed with rich resources of coal, and uses it as its main energy source. Historically, coal had supplied more than 70 per cent of China's energy. It was reported that the share of coal in China's primary energy mix was 76.2 per cent in 1990, whereas the

⁶² See 'China to Have 140 Million Cars by 2020', *China Daily* (Beijing), 5 September 2004.

shares of oil, gas and hydro were 16.6 per cent, 2.1 per cent and 5.1 per cent respectively.⁶³ Coal combustion in China produces 70 per cent of CO₂, 90 per cent of SO₂ emissions and 67 per cent of NO_x emissions.⁶⁴ Hence, facing the problems of drastic air pollution from coal combustion and international concerns over carbon emissions caused by coal use, China realized that its long-term reliance on this resource was simply unsustainable. Hence, China began to reduce coal's dominance by increasing the share of high grade and clean energy: oil, nuclear power, hydro, natural gas, and renewable energy. As a result, the share of coal in total primary energy supply in 2005 decreased to 63.4 per cent, with 13.0 per cent share of renewable and waste energy (See chart 3.1 below). With regard to the electricity generation by fuel in 2005, coal-fired power accounted for 79.0 per cent, while and 15.9 per cent were power generated by hydro and 2.1 per cent by nuclear (See chart 3.2 below).

⁶³ Above n 38, 9.

⁶⁴ Jonathan E. Sinton et al. 'Evaluation of China's Energy Strategy Options' (The China's Sustainable Energy Program, 2005) 19
http://www.people.fas.harvard.edu/~res tern/ documents/LBNL_2005.pdf at 10 August 2011.

Chart 3.1 Share of Total Primary Energy Supply in 2005

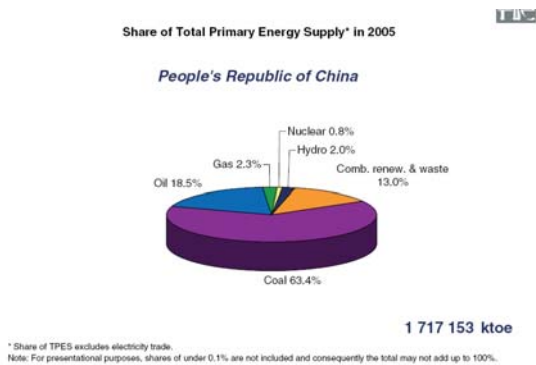
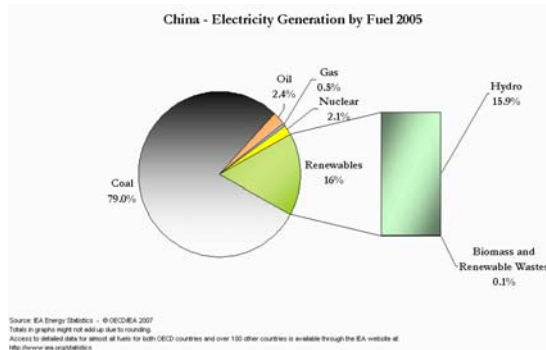


Chart 3.2 China – Electricity Generation by Fuel 2005



Source: IEA Energy Statistics
http://www.iea.org/textbase/stats/pdf_graphs/CNTPESPI.pdf at 10 August 2008.

Furthermore, low energy efficiency and high energy intensity in China, which are measured by the ratio of energy consumption to GDP, may even compound the energy problems. During 1977–97 China’s energy intensity declined about 60

per cent.⁶⁵ However, until 2002, China’s percentage increase in energy consumption was lower in relative terms than its economic growth rate, which increasing efficiency. Still, the energy efficiency is relatively low by an international comparison of energy consumption per unit of GDP. The ratio in 2005 was 0.91, which is 2.4 times higher than the global average, 4.9 times higher than in EU countries, and 8.7 times higher than in Japan.⁶⁶

China’s energy demands will continue to grow with advancing economic development. According to World Energy Outlook 2007, China’s energy demand is expected to more than double by 2030, with coal expected to fuel about one-half of the increase (see the chart 3.3 below). Per capita energy use, however, is low compared to international standards. It is equivalent to about one-half of the world average and only 10 per cent of the per capita energy use in the United States.⁶⁷

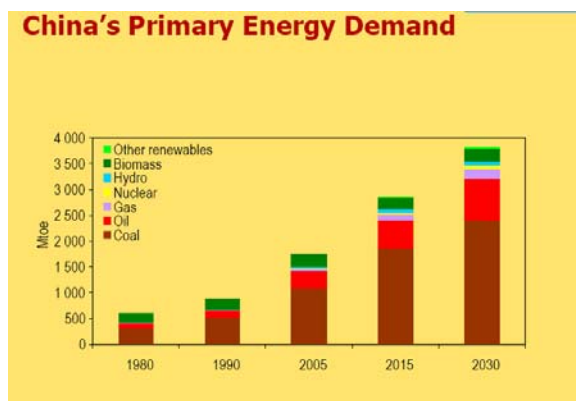
⁶⁵ William Chandler et al. ‘Climate change mitigation in developing countries: Brazil, China, India, Mexico, South Africa, and Turkey’ (Prepared for Pew Centre on Global Climate Change, 2002) 13

http://www.pewclimate.org/docUploads/dev_mitigation.pdf at 10 August 2011.

⁶⁶ Jing Fu, ‘Energy Law Aims at Power Conservation’, *China Daily* (Beijing), 2 July 2006, 2.

⁶⁷ ‘China Human Development Report 2002’ (Stockholm Environment Institute and United Nations Development Pro-

Chart 3.3 China's Primary Energy Demand



Source: IEA Energy Statistics
http://www.iea.org/textbase/speech/2007/Tanaka/weo_beijing.pdf pp8 at 10 August 2011.

Accordingly, China has endeavoured to optimize its energy mix by developing low carbon and renewable energy. However, the dominance of coal as the primary energy supply could not be completely changed in a short-term due to China's lack of clean technologies and the large amount of coal reserves.

Based on the above analysis, large demands for energy, which is dominated by coal, would thus lead to increased carbon emissions in China.

According to the Initial National Communication on Climate Change

gramme, 2002) 55
<http://www.undp.org.cn/downloads/nhdr/nhdr2002.pdf> at 10 August 2011..

of the People's Republic of China,⁶⁸ China's GHG emissions in 1994 were 4,060 million tCO₂e (tons of CO₂ equivalent), of which 3,070 million tons of CO₂. Furthermore, China's GHG emissions in 2004 were about 6,100 million tCO₂e, of which 5,050 million tons of CO₂.⁶⁹ From 1994 to 2004, the annual average growth rate of GHG emissions was around 4 per cent, while the share of CO₂ in total GHG emissions increased from 76 per cent to 83 per cent.⁷⁰ Moreover, there are reports indicating that China has already overtaken the United States as the world's largest GHG emitter.⁷¹ In addition, China's energy-related CO₂ emissions are expected to double by 2030 (See chart 3.4 below).

⁶⁸ Initial National Communication on Climate Change of the People's Republic of China 2007 (the People's Republic of China)

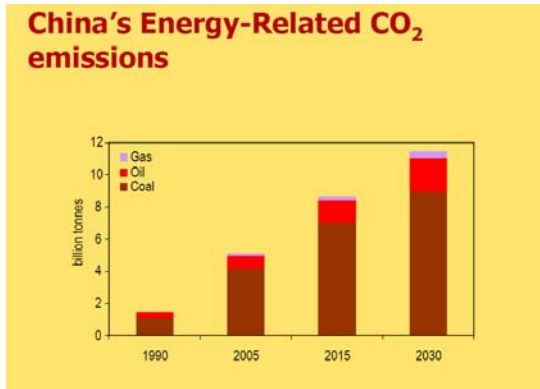
www.ccchina.gov.cn/file/en_source/da/da2004110901.pdf at 10 August 2011.

⁶⁹ Above n 38, 6.

⁷⁰ Fu, above n 66, 6.

⁷¹ See, eg, 'Chinese CO₂ Emissions in Perspective' (Netherlands Environmental Assessment Agency 2007), 'the surging power demand from China's rapidly expanding economy caused CO₂ emissions to rise by 9 per cent in 2006...that increase, coupled with a slight United States decline meant that China's emissions for the year surpassed those of the US by 8 per cent.'

Chart 3.4 China's Energy-Related CO₂ Emissions



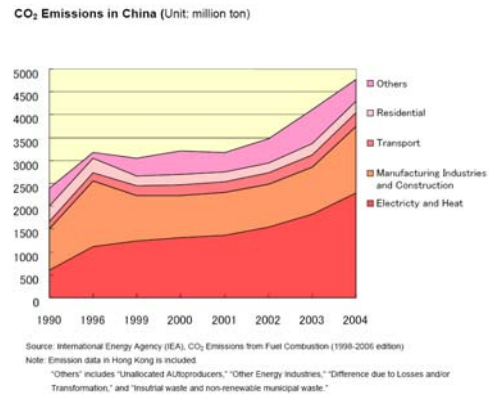
China's Energy-Related CO₂ Emissions © OECD/IEA – 2007 Emissions soar from 5 Gt in 2005 to 11 Gt in 2030, though they remain below current OECD levels in per-capita terms

Most emissions come from electricity and heat generation, followed by industry consumption (See chart 3.5 below). Although in the last few years', transportation in China was responsible for only 9 per cent of China's energy related carbon emissions, it should not be ignored that it is likely to grow dramatically

Despite China's increasing emissions, its historical and per capita GHG emissions are very low. In accordance with the study carried out by the World Resource Institute, cumulative emissions in China accounted for 9.33 per cent of the world total emissions during the period 1950-2002, and the cumulative CO₂ emissions per capita were

61.7 tons over the same period, ranking the 92nd in the world.⁷²


Chart 3.5 CO₂ Emissions in China



Even when compared to earlier data, China's cumulative emissions remain relatively low. During 1850–2002, China contributed only 7.6 per cent while the United States contributed 29.3 per cent and the EU-25 26.5 per cent of emissions.⁷³ In addition, statistics from the International Energy Agency indicate that per capita CO₂ emissions from fossil fuel combustion were 3.65 tons in 2004 in China, which were below the world average and equivalent to one third of the level in Organization for Economic Coop-

⁷² Baumert, T. Herzog and J. Pershing, 'Navigating the Numbers: Greenhouse Gas Data and International Climate Policy' (World Resources Institute, Washington DC 2005) 13 . http://www.worldresourcesforum.org/files/navigating_numbersper cent20-per cent20baumertper cent202005_0.pdf at 10 August 2011.

⁷³ Ibid 14.



eration and Development (OECD) countries.⁷⁴

The effectiveness of a governance system in general may influence the effective global warming mitigation. An effective governance system requires instruments for policy coordination, rule of law, and the realization of established goals. Based on the above, the following section explores how the Chinese government has responded to the threat arising from global warming and carbon emissions.

The Chinese government has adopted a series of policies and programs designed to alleviate the side effects of global warming.

First, climate change has been embodied in the overall national development guidelines and plans. In 1994, China's sustainable development strategy, China's Agenda 21⁷⁵, which described concrete steps towards sustainable development and mounted a response to climate change in the 21st century, with sustainable energy development as one of the major components, was released. Currently, the govern-

⁷⁴ See Statistics and Balance, International Energy Agency <http://www.iea.org/stats/index.asp> Organization for Economic and Cooperation Development (OECD) countries consists of most of the developing countries.

⁷⁵ *China's Agenda 21 1994* (the People's Republic of China) <http://www.acca21.org.cn/english/index.html> at 3 March 2011.

ment is working on the 11th Five-Year Programme for National Economic and Social Development (2006–10)⁷⁶, where GHG emissions is further stressed that energy consumption (per unit of GDP) will be reduced by 20 per cent over five years, that the amount of pollutant will be reduced by 10 per cent, and that forest coverage will be raised to 20 per cent of the national territory.⁷⁷ In order to increase the understanding of climate change in China, at the close of 2006, the warmest year in China since 1951, China released the country's first-ever National Assessment Report on Climate Change⁷⁸, clearly showing the fact that global warming poses a threat to China's development. As it is mandated under the UNFCCC that all parties are required to launch national strategies for climate change mitigation and adaptation to expected impacts, the Chinese government formulated its first national policy specific on climate change: China's National Climate Change Program⁷⁹, in 2007,

⁷⁶ China's Eleventh-Five Year Plan (2006-2010) http://en.ndrc.gov.cn/hot/t20060529_71334.htm 3 March 2010.

⁷⁷ See China's Eleventh Five-Year Plan (2006-2010), Ch 6 http://en.ndrc.gov.cn/hot/t20060529_71334.htm at 3 August 2011.

⁷⁸ *China's National Assessment Report on Climate Change* (I) & (II) <http://www.climatechange.cn/EN/abstract/abstract8379.shtml#> at 3 August 2011.

⁷⁹ National Development and Reform Commission, People's Republic of China, *China's National Climate Change Pro-*

setting out broad goals for arresting global warming and cutting GHG emissions.

Second, besides the overall guidelines, China has carried out concrete programs to reducing GHG emissions. Many new standards on energy have been issued to improve energy efficiency and reduce energy consumption. The China National Institute of Standardization issued a series of new appliance efficiency standards for consumer appliances, such as refrigerators, electromagnetic ovens, washing machines and lamp, with the purpose of assisting to realize the objective of improving energy efficiency by 20 per cent in 2010 stipulated in the 11th Five-Year Plan. Also, there are several developments in the area of energy conservation, with new national conservation standards for public and residential buildings seeking to reduce energy consumption by 65 per cent in Beijing, Chongqing, Shanghai, and Tianjin and by 50 per cent in small cities.⁸⁰ By 2020, China plans to renovate 25 per cent of public and residential buildings in large cities, 15 per cent in medium-sized cities, and 10 per cent in small cities.⁸¹ With the increase of

private cars in China, new passenger vehicle fuel-efficiency standards took effect in July 2005 that call for more stringent standards than those in the US and Japan.⁸² What's more, in June 2007, the State Council decreed that public buildings could not set their air-conditionings below 26 degrees Celsius during the summer and above 20 degrees Celsius in the winter, and even intended to introduce this regulation into legislation.⁸³ China just recently released Emission Standard of Coalbed Methane/Coal Mine Gas (on trial)⁸⁴ in order to enhance the management of emissions and mitigate global warming.

Finally, at a macroeconomic level, China has introduced many economic mechanisms to help to fight against pollution and inefficiency. Government bodies are expected to make the tax rate more preferential for energy efficiency and renewable sectors. For example, according to China's new Corporate Income Tax

gramme (2007)
en.ndrc.gov.cn/newsrelease/P020070604561191006823.pdf at 3 August 2011.

⁸⁰ See Margret Kim and Robert E. Jones, 'China: Climate Change superpower and the Clean Technology Revolution' (2008) 22(3) *Natural Resources & Environment* 9 11.


⁸¹ Ibid.

⁸² See Hongyan H. Olive et al, 'China's Fuel Economy Standards for Passenger Vehicles' (Discussion Paper 2009-03, Harvard Kennedy School, 2009) 15 and 18 .

http://belfercenter.ksg.harvard.edu/files/2009_Oliveretal_Impacts_of_Chinese_Fuel_Economy_Standards.pdf
at 11 August 2011.

⁸³ Kim and Jones, above n 80.

⁸⁴ *Emission Standard of Coalbed Methane/Coal Mine Gas (on trial) 2008* (the People's Republic of China)
www.ep.net.cn/cgi-bin/dbbz/doc.cgi?id=1067 at 11 August 2011.



Law⁸⁵, a three-year tax exemption followed by a three-year half deduction is available for energy- and water-saving projects. In addition, tariffs on environmental goods and services are lowered in order to attract cleaner technologies. China has recently imposed new restrictions on heavy polluters trying to list on domestic stock markets.⁸⁶ According to the new rules, companies from sectors designated as high-polluting and high-energy consuming, which include thermal power, steel, cement and electrolytic aluminium, will have to submit to an environmental inspection if they wish to launch an Initial Public Offerings (IPO) or apply for additional financing.⁸⁷

China has also enacted numerous specialized laws, regulations, procedures, and initiatives on climate change and GHG emissions reduction, which will be discussed in detail in Chapter four.

In addition, the Chinese government has restructured official departments in order to further enhance their environmental protection capacities. In order to enhance

the corporation of environmental policies, plans, and other significant environment problems, the Ministry of Environmental Protection of the People's Republic of China (MEP) has been set up to replace the State Environmental Protection Administration of China (SEPA). This replacement was in accordance with the Government Reshuffle Plan of the State Council in March, 2008. Its administrative level was raised from administration to ministry, enabling improved exertion of its environmental protection function.

A new promotion system has also been launched, under which local officials' careers will be judged by their performance in meeting environmental protection and energy efficiency targets. The reason for the proposal of this new system is that local and provincial officials were judged mainly on their performance in promoting economic growth, and there was little incentive for them to improve environmental quality and energy efficiency. Based on the green assessment of local officials, it is possible for local governments to put environmental issues on the agenda, thus enhancing the enforcement of environmental polices and laws.

The Chinese government has also more actively utilized media to highlight the significance of environmental issues and promote public participation. As the Olympic Games in 2008 were approaching,

⁸⁵ *Corporate Income Tax Law 2008* (the People's Republic of China) www.investteda.org/downloads/Tax.doc at 11 August 2011.

⁸⁶ Agencies, 'Heavy Polluters to be Restricted from Listing', *China Daily* (Beijing), 25 February 2008 http://www.chinadaily.com.cn/bizchina/2008-02/25/content_6482947.htm at 11 August 2011.

⁸⁷ *Ibid.*



China attached more importance to atmospheric quality and committed to new environmental standards. It wanted to show the world that the environmental problems had been improved though its unremitting efforts, and that it was ready to host the Games. Recently, 'environment and climate change' in China has become an importance part of media coverage. Climate change stories appear almost daily in China Daily, the Government's official English-language newspaper, let alone the other local newspapers; when a television is turned on, there is probably a piece of news or a commonweal advertisement about climate change on China Central Television Channel (CCTV).

The conclusion could be drawn that the Chinese government has been making arduous efforts to reduce GHG emissions and to minimize an adverse impact of climate change domestically.


In terms of China's huge population, public attitudes and daily behaviors towards environmental protection will largely influence the progress of global warming mitigation.

Economic development and improved education laid the basis for an increased sensibility towards environmental issues. This is especially true for those Chinese born after the 1970s, who had the opportunities to receive higher education. According to the report of a nationwide survey released in April

2008, nearly 75 per cent of urban Chinese are aware of the importance of a sound ecological environment.⁸⁸ As for the ideal living environment in China, clean air is on the top of list.⁸⁹ Based on that, it can be concluded that most urban people have realized the importance of environmental protection. However, it should be noted that this result cannot represent the environmental awareness of all Chinese. There are large differences between urban areas and rural areas in regards to economic, education or living conditions. Urban people are better educated, and thus, they may be better informed than people living in rural areas. Moreover, the extensive access to internet and other media has placed urban people in a better position to obtain environmental information and express their views. On the contrary, in rural areas, which are more vulnerable to the adverse impact of environmental problems and account for large part of China, people are not concerned about the environmental protection due to the relatively low knowledge levels and living conditions. By this reckoning, environmental awareness in China is relatively low. In

⁸⁸ The research was conducted by the Chinese Ecological Education Promotion Association and the Ecological Culture Research Center under the Peking University. It was carried out in the five cities in different regions of China and lasted more than three month. Accordingly, this survey could be considered to authentically reflect the public environmental awareness in urban areas.

⁸⁹ Ibid.



other words, most Chinese neglect the importance of environment.

In spite of the relatively low level, environmental awareness in Chinese society and consciousness of the tense energy situation have been enhanced. In addition, people would pay more attention to climate change as China launched its first national environmental health action plan to enable the research on health impacts of climate change in China.⁹⁰ The World Bank data demonstrates that almost one billion Chinese people live in air that does not meet the WHO (World Health Organization) standard.⁹¹ However, China has focused too much on its market-driven economic growth and environment-related health consequences have been neglected. As a result, there is little information available about the impact of the deteriorating environment on the health of the population, and people do not know how seriously it affects their health. It is believed that the outcome of this research would alarm people to raise their awareness of the environment.

In conclusion, viewed domestically, the rapid development of China's economy has brought with massive

GHG emissions and will continue to do so in the foreseeable future. Despite enormous efforts to improve the capacity for cutting emissions and improving environmental quality, it is difficult to shift to a low carbon consumption society in the short-term due to the lack of clean technologies and funding in China. Under this scenario, international assistance and cooperation could be of great significance for China to reduce GHG emissions.

⁹⁰ Taige Li, *China Moves to Tackle Pollution Effects on Health*, (26 November 2007)

<http://www.scidev.net/en/news/china-moves-to-tackle-pollution-effects-on-health.html> at 11 August 2011.

⁹¹ Ibid.

3.2 External Pressures: Post-Kyoto Protocol Negotiation

China is not subject to binding emission cut target in the first Kyoto period before 2012.⁹² However, according to its national circumstances, both the economy and emissions growths in China have been increasing rapidly. Due to such a significant role in reducing emissions, China has been actively participating in the UN post-2012 negotiations as well as other arenas in which key countries can meet to discuss global warming mitigation. These include, but are not limited to, the United Nations Climate Change Conferences, the G8+5 Summit, the APEC Economic Leaders' Meeting and the Asia-Pacific Partnership on Clean Development and Climate.

Through these climate change negotiations, China's position on the post-2012 regime is clearly expressed. First, China highlights the major role of the UNFCCC for international community to structure a post-2012 regime and insists on 'common but differentiated responsibilities principle'. Second, China advocates reducing emissions with technical and financial support by developed countries rather than accepting mandatory emission cuts in any post-2012 regime. Third, China recognizes the urgent need to address climate change and is willing

to enter a range of domestic commitments provided that real action is taken from the developed countries. China announced in the Copenhagen Conference that it would reduce its carbon intensity by 40 per cent to 45 per cent by 2020, based on 2005 levels. This essentially means that China will continue to grow, but will do so more efficiently and in ways that will feature reduced emissions.

Based on their national circumstances, different countries have their different positions on the post-2012 regime. Due to different interests, the three stances are held by three groups: the European Union (EU), the so-called Umbrella Group, a group of developed countries excluding the EU and developing countries

(1) The EU's position

The EU sees itself as a champion in the fight against climate change, leading the world in legislation, action and technology regarding energy saving and emission reduction. As the strong advocate of the Kyoto Protocol, the EU as a whole promises an 8 per cent cut of emission between 2008 and 2012.⁹³ Its

⁹² This part is adapted from Xiaoyi Jiang, *Legal Issues for Implementing the Clean Development Mechanism in China*, (Springer: Berlin), 2012.

⁹³ Stefania Bianchi, 'Environment-EU: Carbon Trading Scheme Challenged', Inter Press Service News Agency (Brussels), 15 May 2006 <http://ipsnews.net/news.asp?idnews=33>



emissions are now very close to this target through a series of newly introduced policies. In addition, EU's active participation promotes the development of global carbon market. As mentioned previously, Europe and China are the leading players in the fast-growing business of the CDM. The EU is buying more than 80 per cent of all emission credits globally.⁹⁴

The EU has committed to reducing its greenhouse gas emissions by 20 per cent by 2020 compared with the levels of 1990.⁹⁵ Furthermore, it was considering raising its carbon cutting target to a 30 per cent cut if a legally binding treaty for post-2012 era was concluded.⁹⁶ Although the EU has committed to battling global warming with the binding target beyond 2012, it is watching the move of the US and the major developing countries. It believes that the shift in economic weight for developing countries as well as the US could impact on the future approaches to global warming. The economic growth of developing countries in combination with relatively low economic growth rates in the EU implies that the latter's relative share in global GDP, global energy demand (from 16.6 per cent in 2001 to 12.5 per cent in

2030⁹⁷), and global CO₂ emissions (from 14 per cent in 2000 to 8 per cent in 2050⁹⁸) will decrease, while the shares of developing countries will increase. In this case, countries such as China, the US, India, Japan, Russia and Brazil will be the leading economies of the future and should be part of new commitments to address global warming.⁹⁹ The EU has urged them to set emissions reduction targets. Moreover, the European Commission has proposed freezing new demand for CDM projects in 2012 unless the major polluters, like the US, China and India, set emissions reductions targets.¹⁰⁰

(2) The Umbrella Group members' positions

The Umbrella Group is a loose association of developed countries. Without a formal list, the group in-

233 at 8 August 2011.

⁹⁴ Capoor and Ambrosi, above n 56, 33.

⁹⁵ 'Information Note on the UNFCCC' (Council of the European Union), 15838/09, 11 November 2009, 2 www.consilium.europa.eu/uedocs/cmsUpload/ST15838_09.pdf at 8 August 2011.

⁹⁶ Ibid 6.

⁹⁷ See 'World Energy Outlook 2004' (International Energy Agency, 2004) 59-80 www.iea.org/weo/docs/weo2004/WEO2004.pdf at 8 August 2011.

⁹⁸ See 'Winning the battle against global climate change' (European Commission, 2005) 35.

⁹⁹ Wilbur Perlot, 'Post-Kyoto and the Position of the European Union' (Briefing papers, Clingendael International Energy Programme, 2005) 4

http://www.clingendael.nl/publications/2005/20050823_ciep_briefing_perlot_poskyoto.pdf at 9 September 2011.

¹⁰⁰ See 'State and Trends of the Carbon Market 2008' (2008) The World Bank <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY2/0,,contentMDK:21759158~menuPK:4137780~pagePK:64020865~piPK:149114~theSitePK:4114200,00.html> at 8 August 2011.

cludes the United States, Australia and Japan. These countries have the similar positions regarding their reduction obligations in the post-2010 regime. Their medium-term emission reduction targets for 2020 are low and conditional on the participation of major developing countries.

(2) The United States

The US is not only the largest and technologically most powerful economy in the world but also possesses the largest share of historical emissions. Moreover, the US ranks the first in the world regarding per capita emission level. However, the economic growth of the US is not as rapid as that of the major developing countries, like China and India. The GDP growth rate in the US has been less than 3 per cent for the four consecutive years from 2006-09,¹⁰¹ which means the increase rate of energy demand would be relatively low compared to the other major developing countries.

In spite of the huge contribution to the global carbon emissions, the US has not ratified the Kyoto Protocol.¹⁰² The United States former

¹⁰¹ United States GDP Growth Rate (2009) Global Economic Research <http://www.tradingeconomics.com/Economics/GDP-Growth.aspx?Symbol=USD> at 8 August 2011.


¹⁰² President Bush gave three reasons why the US refused to ratify the Kyoto Protocol: 1) the goals of this protocol

President Bush announced in 2007's G8 summit that the US would work with other nations to establish a new international approach to energy security and climate change. Moreover, the US has promised to lead the world to produce fewer GHG emissions, but do it in a way that does not undermine economic growth or prevent nations from creating greater prosperity for their people.¹⁰³ With regards to the GHG emissions in the post-2012 regime, Bush was reported to have said that the US cannot be expected to agree to emissions reductions unless China and India undertake similar obligations.¹⁰⁴ He also argued that doing so would result in the US industries and jobs moving out to the countries that do not have emission reduction commitments and would

could greatly hurt the economy of the US, leading to economic losses of \$400 billion and costing 4.9 million jobs. 2) large developing countries, like China and India, are exempted from the reduction obligations under the Kyoto Protocol. 3) there are still some scientific uncertainties.

¹⁰³ President Bush Participates in Major Economies Meeting on Energy Security and Climate Change <http://www.state.gov/g/oes/rls/rm/2007/92938.htm> at 8 August 2011.

¹⁰⁴ Shyma Saran, *Climate Change - From Back Room to Board Room - What Indian Business Needs to Know about India's Approach to Multilateral Negotiations on Climate Change* (2008), available at <http://meaindia.nic.in/mystart.php?id=515713883> at 1 June 2011.



therefore in any case not lead to global warming mitigation.¹⁰⁵

The US has become less negative in tackling climate change since President Barack Obama took office. The Obama government actively promotes new energy policies and the American Clean Energy and Security Act¹⁰⁶ which is an energy bill establishing a version of a cap-and-trade plan for GHG and addressing climate change was approved in June 2009. Based on this act, the United States is empowered to impose carbon tariffs on imports from the countries that do not have limited emission reduction targets. In spite of the active stance, this country still refuses to adopt the Kyoto Protocol. However, it has promised to commit to enhancing financial support for developing countries to address climate change in the context of transparency of the mitigation actions of the major developing countries.

(3) Japan

Japan, one of the world's biggest emitters of GHGs, has a target under the Kyoto Protocol to cut its emissions by 6 per cent from 1990 levels over the period from 2008-2012. However, meeting the Kyoto target may be difficult as Japan's GHGs emissions are set to rise over the next few years. According to an

interim report issued by a Japan government advisory panel, Japan's emissions are forecast to rise by 0.9 per cent in the fiscal year ending in March 2011 and are likely to increase 0.9-2.1 per cent from 1990.¹⁰⁷ In spite of the difficulties, Japan still shows determination to fulfil its pledges and is considering new measures to achieve the target.

With regard to the post-2012 regime, the Japanese Prime Minister stated that Japan would assume the responsibility for creating a post-2012 framework and setting a fair emissions reduction target for the world as a whole, including all the major polluter nations.¹⁰⁸ The 'sectoral approach' to reducing carbon emissions was proposed.¹⁰⁹ Also, Japan seeks to design an emissions trading program helping fight climate change after the

¹⁰⁷ See Elaine Lies, *Japan Emissions to Rise, Reaching Kyoto Goals Hard* (2007) Reuters

<http://www.reuters.com/article/idUST285136> at 15 August 2011.

¹⁰⁸ Yukio Hatoyama, 'Statement by H.E. DR. Yukio Hatoyama Prime Minister of Japan at the United Nations Summit on Climate Change' (New York, 22 September 2009) 3
www.montreal.ca.embjpan.go.jp/pdf/PM_statement_220909.pdf at 15 August 2011.

¹⁰⁹ As mentioned earlier, This debatable bottoms-up approach is to identify carbon-intensive industries, such as power, steel, cement, transportation and building and construction and to set uniform global efficiency norms and lower carbon emission standards for each sector, which added up would then form a national target.

¹⁰⁵ Ibid.

¹⁰⁶ *American Clean Energy and Security Act of 2009*, ACES (2009).

Kyoto Protocol expires in 2012. Even though a target of reducing GHG emissions by 25 per cent by 2020 against 1990 levels was announced in Copenhagen, it would be contingent on a deal involving all major emitters.¹¹⁰

(4) Australia

Australia, with 0.32 per cent of the global population, contributes 1.43 per cent of the world's carbon emissions.¹¹¹ Hence, it is not surprising that Australia's per capita emissions are higher in comparison with other developed countries. Its per capita emissions in 2004 were 4.5 times the global average, just below the value for the US.¹¹² Despite the big emission on a per capita basis, Australia was granted a limitation of an 8 per cent increase Kyoto target.¹¹³

¹¹⁰ Hatoyama, above n 108, 1.

¹¹¹ Mike Raupach, 'CO2 Emissions Increasing Faster than Expected' (Working Paper No 07/89, CSIRO Marine and Atmospheric Research and the Global Carbon Project, 2007) 3.

¹¹² Ibid.

¹¹³ The UNFCCC gives special considerations to some countries. Article 4, section 8(h) of the UNFCCC stipulates that 'Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products'. Australia belongs to that kind of countries as it is the world's largest coal exporter and is reliant on fossil fuel for transportation and energy.

The Australian government moved to ratify the Kyoto Protocol in December 2007. The Australia government had committed to reducing emissions by 60 percent on 2000 levels by 2050 and has studied how to achieve or even over-achieve this target for Australia.¹¹⁴


The government has taken measures, including the Renewable Energy Target Scheme, which is to ensure that 20 per cent of Australia's electricity supply comes from renewable sources by 2020 and the Emission Trading Scheme, to slow the rise of carbon emissions. Regarding the post-2012 regime, the Prime Minister said that China and India as well as the US must be prepared to make commitments in the fight against global warming.

(5) Developing countries' positions

Based on different interests, Copenhagen saw three demands from three groups: the Group of 77 (G 77) and China,¹¹⁵ Small Island De-

¹¹⁴ See Hon Martin Ferguson, *Australia's Energy Security and the Clean Energy Challenge* (2008) Minister for Resources and Energy <http://minister.ret.gov.au/TheHonMartinFergusonMP/Pages/Australia'sEnergySecurityandtheCleanEnergyChallenge.aspx.html> at 3 March 2011.

¹¹⁵ The Group of 77 at the United Nations is a loose coalition of developing nations, designed to promote its members' collective economic interests and create an enhanced joint negotiating capacity in the United Nations. There were 77 founding members of the organization on 1964, but the



veloping States (SIDS) and Tropical Forest Group.

– The G 77 and China

The G 77 includes most of the developing countries and their positions are consistent with China's. They agree on long-term cooperative actions on climate change, mitigation of emissions, adaptation to the impact of climate change, as well as provision of financial and technological support to developing countries.¹¹⁶ In addition, they stated that developed nations should honour their commitment to accomplishing or establishing the medium-term emission reduction targets. Moreover, concerns of the least developed countries, small island developing states and African countries should be considered.¹¹⁷

In addition, after China announced to reduce its carbon intensity, India followed with an announcement of 24 per cent reduction by 2020.¹¹⁸ India is regarded as an-

other so-called "major emitter" due to its huge population and rapid economic growth, and is also the focus of negotiations on mitigating global warming for the post-2012 era. However, India does not consider itself to be a major emitter as it argues that neither the total volume of its CO₂ emissions nor its per capita emissions today, would qualify it in the category of "major emitters".¹¹⁹ It insists on the per capita standard and emphasizes the distinction between 'lifestyle emissions' and 'survival emissions' to address global warming issues.¹²⁰ Accordingly, India claims that it is not prepared to accept any limitation on its carbon emissions in the post-2012 period.

Brazil, constituting another major developing country, made an ambitious proposal to fight climate change at meetings in Copenhagen. It pledged to reduce the pace of the Amazon's deforestation by 80 per cent and make its emission levels reach to the levels of 2005

organization has since expanded to 134 member countries. China is not its member, but it supports the G 77's claims.

¹¹⁶ 'Backgrounder: Three major stances in Copenhagen climate change negotiations' *Xinhua* (Beijing), 9 December 2009

http://www.chinataiwan.org/english/specialreports/sr/Climate/267/43/200912/t20091209_1168909.htm at 3 March 2011.

¹¹⁷ Ibid.

¹¹⁸ Aaron Wiener, *India steps up and pledges emissions targets* (2009) UN Dispatch

<http://www.undispatch.com/india-steps-and-pledges-emissions-targets> at 12 December 2010.

¹¹⁹ See Saran, above n 74. In spite of 1.15 billion population and 8.5per cent GDP growth rate in 2007, India's total emissions are 4per cent of the global figure and it emits about 1.1 tons of CO₂ per capita while the corresponding figure for the US is more than 20 tons.

Furthermore, India accounted for only 2 per cent of the cumulative CO₂ emissions in the period between 1850 and 2000.

¹²⁰ Ibid 78.

by 2020.¹²¹ Furthermore, it promised to provide funding for the least developed countries to address climate change.

– Small Island Developing States (SIDS)

SIDS is another coalition of developing countries, representing 43 island developing countries with low coastlines. These countries are most vulnerable to sea level rises caused by climate change. Facing this situation, they not only put forward Tuvalu's Proposals¹²² at the Copenhagen Conference to call for a new legally binding agreement to include commitments from the US but also other issues such as adaptation and finance. In addition, they also claimed that the global emissions should be reduced by 85 per cent by 2050.¹²³

¹²¹ Raymond Colitt, 'Brazil eyes capping emissions at 2005 levels', Reuters (Brazilia), 13 October 2009
<http://www.alertnet.org/thenews/newsdesk/N1315528.htm> at 12 December 2010.

¹²² Tuvalu was calling for a discussion on what form the final deal from Copenhagen will take. The small island states put forward a proposal for a new protocol – in addition to the Kyoto Protocol – to include the commitments from the US and the other issues such as adaptation and finance.

¹²³ *Ahead of Copenhagen talks, small island nations sound alarm at UN on climate change* (2009) UN New Center
<http://www.un.org/apps/news/story.asp?NewsID=32265> at 12 December 2010.

– Tropical Forest Group

The Tropical Forest Group is composed of rainforest countries in Africa and South America. These countries need the security of finance to realize the objective for reducing deforestation by at least 50 per cent by 2020.¹²⁴ They stress developed countries' responsibility to provide financial support.

It can be concluded from the above that: first, all the countries have recognized the urgency of reducing carbon emissions and are involved in the post-2012 negotiations. Although the post-2012 negotiations have not been concluded, most countries have set their individual numerical target for addressing emission reduction beyond 2012. Moreover, they are taking or have promised to take measures in order to reduce their domestic emissions in different forms.

Second, national interests are the root cause of different positions on the post-2012 regime. The divisions between developing and developed countries and between the EU and the US originate in different national interests and are according to different national circumstances.

¹²⁴ *The EU's negotiating position for Copenhagen* (2009) Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
<http://www.un.org/apps/news/story.asp?NewsID=32265> at 12 December 2010.




Third, China's and the United State's positions play a decisive role in designing a post-2012 framework. China functions as a model for other developing countries. When China leads, other developing countries will follow. In addition, the United State's position influences the other countries' stances with regard to their obligations in the post-2012 regime.

Finally, divisions between developing countries and developed countries, especially between the United States and China, are the critical factor impeding the post-2012 negotiations. The division derives from the following questions: Should countries share their reduction obligations on the basis of historical emissions or future emissions? Should countries share their reduction obligations based on per capita emissions or nation wide emissions? The major developing countries, which have both relatively low historical and per capita emissions, are expected to produce substantial emissions due to economic growth in the coming decades. By contrast, the major developed countries, which are the main contributors to the current global warming, will decrease their shares in global carbon emissions with their relatively low economic growth rates. In this scenario, most developed nations believe that for the next global agreement to be meaningfully, it must contain GHG reduction commitments from China, India and the other large developing economies. The developing

countries, however, are reluctant to commit to specific targets because of the restrictive effects that such targets may have on their industrial development. Consequently, although the developed countries under the Kyoto Protocol are urging the US and China to accept mandatory emission cuts in a post-2012 regime, neither of them are willing to move.

Based on the above analysis, the US and China would play a decisive role in the post-2012 period. If China insists its position on climate change for the post-2012 regime era, other developing countries would follow China and not possibly accept any fixed reduction targets. In terms of the promises regarding emissions reductions that have been made by some developed countries, two scenarios would probably occur. One scenario is that a new global agreement on climate change would go forward beyond 2012 without the US and China's involvement; the other scenario is that all the developed countries, including the US would agree a new pact with fixed reduction targets beyond 2012.

The first scenario would be a new agreement without inclusion of the US and China beyond 2012. First, from a global perspective, it will be a formidable task of slashing overall emissions by 50 per cent from 1990 levels by 2050 without the inclusion of the US and China. A concrete reduction target averting the irreversible consequence of global



warming has been concluded by IPCC. Nonetheless, it is impossible to achieve the 50 per cent reduction target by 2050 without inclusion of the US and the major developing countries, which together account for more than half of the world emissions. Furthermore, the fact that emission figures in the developing countries would continue to increase at a speedy rate in a few years complicates the problem. Although the US is seeking less demanding alternatives and China has endeavoured to improve its energy efficiency, whether these measures will prove to be more or less effective than the new agreement with the fixed targets in the post-2012 period is a question that will not be answered until it may be too late to plot a new approach.

The US and China would face great pressure of not accepting fixed targets beyond 2012. The other developed countries that have determined to reduce emissions with the fixed targets under the new agreement in the post-2012 period may constantly urge for the involvement of the US and major developing countries. Moreover, the competition among developing countries in the CDM market would be more intensive beyond 2012 without the carbon credits demand from the US and the support from EU.

Another scenario would be a new agreement without the inclusion of China beyond 2012. In this scenario, all the major developed

countries would ratify a new agreement to replace the Kyoto Protocol beyond 2012, leaving China and the other major developing countries without binding reduction targets. In this scenario, China would on the one hand, not sacrifice its economic development to reduce carbon emissions but on the other hand, would have to face many challenges that may arise beyond 2012.

First, China and the whole world may suffer the consequences of global warming. It is predicted that China and other developing countries would account for more than half of the planet's emissions in a few decades. Therefore, unless the carbon emissions are effectively reduced in these countries, global warming would not be averted.

Second, China would be under great pressure internationally. When the US is included in the new agreement, China, which has already become the world's biggest GHG emitter, together with other rapidly developing countries would undoubtedly be a focal point in the climate regime.

Third, although China may benefit from massive carbon credits demands in the CDM market as a result of the inclusion of the US in the new agreement beyond 2012, there would be a negative impact on China's economic development in the long-term. In the context of economic globalization, China has



become the world industry base with its cheap labour and relatively favourable investment climate. As a world factory, China has not only obtained much needed capital and technologies, but also promoted its economic growth. However, the expenses could not be neglected. Once the infrastructure and equipment of these factories, most of which are with high energy consumption and emissions, are put into use, their average duration would be at least between 15-50 years. During this period, the corresponding technologies and capital would be locked until the investment is returned.¹²⁵ Hence, when China accepts reduction obligations in the future, these factories would be an impediment to the development of a low carbon economy in China. Even if China transfers these factories, the economic development and employment would be undermined. On top of that, the problem of carbon emission leakage¹²⁶ would derive from the fact that realizing fixed reduction targets could accelerate the trend of developing carbon-intensive industries overseas by developed countries. Considering the above mentioned circumstance, the pressure China will have to face in the future is of no surprise.

¹²⁵ In the economic science this is called 'Lock in Effect'.

¹²⁶ Emission leakage is a concept referring to the problem that emission abatement achieved in one location may be offset by increased emissions in unregulated locations.

In addition, China's foreign trade would be affected beyond 2012. Entering into the new century, foreign investment in China has been steadily growing. According to the statistics unveiled by the website of Ministry of Commerce of China,¹²⁷ the value of foreign trade in China has accounted for nearly 70 per cent of GDP and the export value with nearly 40 per cent. The US is the no. one export pattern with China. Against this backdrop, China and other countries, in particular the US, have become more interdependent in their economic development. However, as claimed by the US former President Bush, the goal of emissions reduction would incur economic losses in the US. In terms of the interdependence, the decrease of the US economic development would also weaken China's foreign trade. In this regard, China's economic development would be under attack beyond 2012.

In conclusion, with China jumping past the US as the largest CO2 emitter, it will face a great challenge of reducing its carbon emissions beyond 2012. Even if China is not allocated with binding reduction target under the new agreement, it would be subject to considerably adverse consequences of global warming, not limited to environmental consequences. Facing this situation, it is urgent for China to find a way that

¹²⁷ See the website of Ministry of Commerce People's Republic of China <http://english.mofcom.gov.cn/statistic/statistic.html>.

leads to sustainable development and a low carbon economy.

4. Feasibility of CO₂ ETS in China

4.1 Policy Support

Although China and other developing nations have not been bound by the protocol to reduce emissions of the gases blamed for global warming and climate change, China has been the largest emitter. For the long-term interests, addressing climate change is regarded as one of the important strategies of China's economic and social development, and following goals have set to control the emissions of GHGs until 2020 before the Copenhagen Climate Summit as China's contribution to the international efforts addressing climate change:


- lower CO₂ emissions per unit of GDP by 40–45 per cent by 2020 compared to 2005;
- increase the share of non-fossil fuels in primary energy consumption to around 15 per cent by 2020, and
- increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from 2005.

China's attempts to address emissions have predominantly focused on legislation in areas such as energy efficiency, the feed-in tariff under its renewables law, or ad-

ministrative measures. Having adopted market mechanisms throughout its economy, China is now embracing carbon trading and is exploring provincial and/or city-based trading schemes.

First, the ETS in China is supported by the national economic and social development plan. Faced with severe pollution, a predicted surge in urbanisation and a struggle to ensure adequate energy supplies to fuel its rapid growth, China has outlined plans to reduce carbon emissions in its latest five-year economic plan. The 12th Five Year Plan was endorsed by the National People's Congress on 14 March 2011. China's Five Year Plan seeks to establish a "green, low-carbon development concept". This is the first Plan to include a commitment to gradually introduce market mechanisms to control carbon pollution. China announced several new carbon and energy targets from 2010 levels, namely:

- increase the proportion of non-fossil fuels in energy consumption to 11.4 per cent by 2015;

- 
- reduce energy consumption per unit of gross domestic product (GDP) by 16 per cent from 2010 levels by 2015; and
 - reduce carbon dioxide emissions per unit of GDP by 17 per cent from 2010 levels by 2015.

The Five Year Plan refers to establishing low-carbon product standards, improving the statistical accounting systems for GHG emissions and the “step by step establishment of carbon emission trading markets”. The use of market mechanisms to incentivise energy savings was included in the Plan.


The Five Year Plan also highlighted priority 'strategic emerging industries' for industrial innovation and development. These included:

- energy efficiency technologies, recycling, and waste management;
- advanced nuclear energy, wind, solar, smart grids and biomass; and
- hybrid and pure electric vehicles.

Second, The Working Strategy on controlling GHG emissions under the 12th Five Year Plan was released by the National Development and Reform Commission (NDRC) subsequently in 2011 with a commitment to realizing the reduction goal under the plan. Attempts to establish carbon emissions trading market are addressed in the working strat-

egy. First of all, it is required to establish project-based national voluntary emission trading schemes and implementing mandatory cap and trade carbon emissions trading pilot schemes. In addition, the establishment of the supporting system for carbon emissions trading should be enhanced.

With the support of the 12th Five Year Plan, NDRC of China has approved a mandatory “Cap and trade” emissions trading pilot scheme in seven provincial regions by 2013 and will expand it nationally in 2015 in an effort to encourage carbon emission reductions. The municipalities and provinces given the green-light include Beijing, Tianjin, Shanghai, Chongqing, Shenzhen, Hubei and Guangdong. Schemes are intended to be launched in 2013 and the key issues, including the future design of the pilot schemes, timetable for implementation, obstacles and challenges remaining and perspectives for a nation-wide emissions trading scheme are still under discussion. If the schemes were introduced in 2013, China could consider introducing a nation-wide emissions trading scheme in its next 5 year plan, covering the period starting in 2016. Making cap-and-trade a reality in China will be challenging. The future success or failure of the emissions trading scheme in China will have major implications on the future of carbon trading globally.



Besides the carbon trading, the NDRC also designated thirteen areas to operate a variety of pilot schemes as part of the country's commitment to reduce its emissions. In July of 2010, NDRC issued the policy paper "Notification on Advancing the Low Carbon Pilot Projects on Province and City Level". According to the paper, pilot schemes will be deployed in five provinces – Guangdong, Hubei, Liaoning, Shaanxi and Yunnan – as well as eight cities – Tianjin, Chongqing, Hangzhou, Xiamen, Shenzhen, Guiyang, Nanchang and Baoding. Each city and province will be expected to develop its own plan to reduce emissions, and submit a strategy for developing a lower carbon economy, some of which are expected to include carbon trading schemes, for inclusion in China's 12th Five Year Plan (2011-2015).

Relevant government officials of those provinces and cities have promised to research and develop a low-carbon development plan, to accelerate the establishment of an industry structure featuring low carbon emissions and to actively promote low-carbon lifestyles and consumption patterns in order to help tackle global climate change. The governments of these experimental provinces and cities will clearly establish operational goals, major tasks and specific measures

of controlling the local emissions of GHGs. In addition, they will also establish the statistics and management system of GHG emissions and actively promote the low carbon lifestyle and consumption pattern in order to reduce the carbon emissions. The NDRC also required the experimental areas to explore a mechanism to promote energy conservation and emissions reduction as well as the development of the low-carbon industry and implement the target-related responsibility system in controlling GHG emissions.

Additionally, the experimental areas are required to explore effective government guidance and economic incentive policies, study and apply the market mechanism to achieve the emissions goal as well as closely follow the latest technological advancements in the low carbon field. Furthermore, they are expected to actively promote the introduction, absorption and re-innovation of technologies or to conduct joint research and development on new technologies with overseas companies. It can be observed that reducing carbon emissions and establishing ETS in China has been put on top of the agenda and that the Chinese Government consequently has created a favorable political environment for ETS in China.



4.2 Case Studies on ET of SO₂

Sulphur dioxide (SO₂) is one of the pollutants responsible for acid rain, which can damage forests and acidify lakes and streams, rendering some of them incapable of supporting aquatic life. SO₂ air pollution also causes respiratory and other health problems for people. A cap-and-trade system was firstly imposed on SO₂ emissions in the US in the context of acid rain reduction under Title IV of the Clean Air Act amendments of 1990.


The 11th Five-Year Plan (2006–2010) of China established a mandatory SO₂ emission reduction target of 10 per cent. To encourage sustainable reductions in SO₂ emissions, the Chinese Government proposed a market-based SO₂ trading system be utilized to complement command-and-control instruments. The introduction of an SO₂ trading system provides a market-based mechanism to manage SO₂ emissions at the least economic cost. The Government sets a national emissions cap before establishing an emission trading platform based on emission allowances allocated to SO₂ emitters. Emission sources with excess reductions can then trade their allowances. The trading system operates to identify least-cost emission reductions. This cap-and-trade system complements existing policy initiatives to reduce SO₂ emissions. The national SO₂ ETS has not been set up so far,

but the pilot SO₂ trading projects at the city and provincial levels in China have provided valuable lessons for developing a carbon trading scheme. Additionally, it is reported that SO₂ emissions were reduced by 29 percent in 2010 compared with 2005 levels.¹²⁸ Therefore, it is necessary to conduct a case study on SO₂ ETS in China. A program for controlling SO₂ emissions in Taiyuan city, Shanxi Province is a good case to study on the initial stage of the implementation of emissions trading.¹²⁹ What makes the Taiyuan project distinct is that it not only tests the effectiveness of a cap-and-trade program in a severely polluted city, but identifies the features that are crucial for any future national implementation.

Taiyuan was selected to run the experiment for good reasons. First of all, the SO₂ pollution in Taiyuan is very severe and the local author-

¹²⁸ **China to pilot carbon emission rights trading scheme: economic planner (2011-11-12), Xinhua New, http://news.xinhuanet.com/english/2010/china/2011-11/22/c_131263322.htm at December 2011.**

¹²⁹ **The case study of Taiyuan SO₂ ETS below is adapted from Bo Mian's PhD thesis entitled *Designing a National Emissions Trading System to Control Multiple Airborne Pollutants in China* (2007), 91-110.**



ity was facing enormous pressure to improve the air quality from both inside and outside. Secondly, the city government had formulated an ambitious total emissions control goal of 50 per cent SO₂ reduction off the 2000 level by 2005.¹³⁰

After careful preparations, a tradable permit system targeting SO₂ emissions was launched in 2002. The basic elements of the Taiyuan program are summarised in the following table:

¹³⁰ The ambient SO₂ concentrations were 0.2mg/m³ in 2000, three times higher than the Class II standards that are deemed to be the acceptable standards for me to live in urban cities. See Jintian Yang and Jeremy Schreifels, 'Implementing SO₂ Emissions in China' (Paper presented at OECD Global Forum on Sustainable Development: Emissions Trading, Concerted Action on Tradable Emissions Permits Country Forum, Paris, 17-18 March 2003) available at: www.oecd.org/dataoecd/11/23/2957744.pdf (last visited on 3 June 2004).

Table 4.1: Summary of the Taiyuan Program

Legal basis	Regulation on TEC in Taiyuan City and ARET Taiyuan.
Cap and timing	TEC limits for the national 10 th Five-Year-Plan – 125,000 tons in 2005.
Scope: emissions and sectors covered	Smokestack SO ₂ emissions from 26 key polluting enterprises accounting for 50 per cent of the city's SO ₂ emissions, including power plants, iron and steel enterprises, district heating provider, and other heavy industrial sources.
Allocation of allowances ¹³¹	Grandfathering, small-portion auction is also allowed in the legislation.
Allocation method	Data of firm's actual reported SO ₂ emissions in 2000–01 forms the basis of their allocation share.
Monitoring and measurement	Continuous Emission Monitoring System (CEMS) are installed for a handful of large sources; less accurate methods like material balance are also applied; periodic on-site inspections are carried out by local EPB.
Tracking systems	An emissions-tracking system and an allowance-tracking system are both established with US EPA's help.
Offsets	Early reductions are not recognized.
Banking and borrowing	Banking of permits is allowed as long as prior approval is obtained from the EPB, but borrowing of future allowances is prohibited.
Punitive mechanism	A financial penalty is set for enterprises failing to submit sufficient allowances for their yearly emissions. However, the total penalties are set at a level far below the marginal abatement costs.

Source: RFF team, Richard D. Morgenstern et al, 2004.

¹³¹ One allowance is equal to one ton of SO₂ emissions and may be used to authorize SO₂ emissions during the year for which was allocated or for subsequent years.

The performance of the Taiyuan program was disappointing. In a phone interview conducted in November 2004, officers in the local EPB revealed that there was only one single trade since the program was initiated.¹³² The situation changed slightly in 2005. The latest news with respect to the Taiyuan program reports that twelve trades took place among 12 firms before June 2005.¹³³ From the available information, it can be observed that almost all the trades are of small volumes. For instance, the traded amount of SO₂ allowances in seven trades that took place between the Xiaodian Heating Company and seven other enterprises ranged from 1 ton to 67 tons, with most around 10 tons, totalling 122.7 tons.¹³⁴

There are surely other accomplishments of Taiyuan project.¹³⁵ Firstly,

¹³² Interview with an officer of the Taiyuan EPB (Telephone 12 November 2004), interviewee remains anonymous as indicated. The trade took place in 2002 between Taiyuan Chemical Industry Company (seller) and the China Lanxing Company (buyer). The buyer purchased 67 tons SO₂ allowances from the seller by the arrangement of local EPB. The price remained confidential.

¹³³ Kexing Zhang and Shi Baoyu, 'Taiyuan City is Encouraging SO₂ Emissions Trading' (2005), available at: <http://www.tyshbj.com.cn/newweb/hbxx/dongtai1.asp?id=246> (last visited on 6 May 2007).

¹³⁴ Ibid.


¹³⁵ The RFF teams summarized the achievements of Taiyuan program in its report. See Richard D. Morgenstern et al, 'Emissions Trading to Improve

a legal regulation (ARET Taiyuan) was promulgated by the local government and forms the legal basis for the SO₂ allowances trading regime in the city. This piece of legislation is unique because it is the first regulation enacted by a city government that provides legislative support for a tradable permit system in China. It serves as a good model for putting forward future relevant legislations, as the ARET Taiyuan incorporates many crucial features of designing an emissions trading regime and creates a relatively strong foundation for the implementation, i.

Secondly, from the perspective of technical support, with the help from US, EPA, an emissions tracking system (ETS) as well as an allowances system (ATS) have been established for monitoring purposes. The ETS is important as it integrates technical monitoring information collected by Taiyuan EPB with additional data on coal purchases, new SO₂ control measures taken, enterprise-level output, and other factors.¹³⁶ The ATS holds the allowance account of individual firms, tracks the transfer of allowance between trading accounts, and verifies trades. The two systems, if properly operated, will be able to ensure, to a large extent, the credibility of the trading sys-

Air Quality in an Industrial City in the People's Republic of China' (Discussion Paper 04-16, Resource for the Future, 2004).

¹³⁶ Ibid.



tem.¹³⁷ As a result of running the two systems, Taiyuan has become one of the few cities that have relatively comprehensive information about enterprises' production and emissions. Thus, if a national emissions trading was waged in the foreseeable future, Taiyuan would experience much less difficulty in collecting the requisite data than most other cities.

Thirdly, CEMS have been installed in a handful of large sources.¹³⁸ The high expenditure in equipping stationary enterprises with CEMS, the most accurate method for measuring emissions, has long troubled local environmental agencies. With the financial assistance from the ADB, the Taiyuan EPB is able to install the best monitoring equipment in some large emitters.¹³⁹ It is assumed that the enterprises' actual emissions will be reported to the local environmental authority on a

timely basis and thus form an appropriate basis for gauging the emissions or granting related allowances in the case of proper operation of the CEMS.¹⁴⁰ However, many experts have expressed concerns as to the enterprises' unwillingness to run the installed CEMS due to the high operating fees. It is suggested that it does not present much difficulty for firms to turn off CEMS if no operation standards are available and local EPB only inspects periodically.

Fourthly, the Taiyuan project tested a couple of essential elements of a tradable permits system. Of particular importance is the allocating method employed by the regulators. The local EPB adopts "grandfathering"¹⁴¹ and distributes the initial al-


¹³⁷ Ibid.

¹³⁸ The RFF teams do not uncover the exact number of CEMS that have been installed. However, it is reported that the Taiyuan government has been kept requiring the emitting sources to install CEMS since the program got started. See *Notice on Strengthening the instalment and Network Connection of CEMS*, available at: <http://www.tyshbj.com.cn/newweb/wuranfangzhi/fangzhi1.asp?id=19> (last visited on 5 April 2006); *Notice on installing CEMS at Enterprises at the Second Round*, available at: http://news.xinhuanet.com/misc/2005-10/07/content_3590248.htm (last visited on 5 April 2006).

¹³⁹ See Morgenstern et al., above n 135.

¹⁴⁰ The actual number of enterprises equipped with CEMS is not publicly known. But according to some official documents regarding equipping qualified firms with CEMS from the Taiyuan EPB website, it could be inferred that at least a handful of CEMS have been installed. See *Notice on Strengthening the Instalment and Network Connection of CEMS*, above n 138.

¹⁴¹ Grandfathering often refers to the allocation that is based upon historical data rather than contemporaneous or future data. However, it should be noted that this term has a meaning in emissions trading that differs from its use in other contexts, such as when it implies exemption from tax or regulatory provisions. See A. Denny Ellerman, Paul L. Joskow, and David Harrison, Jr., 'Emissions Trading in the US: Experience, Lessons and Considerations for Greenhouse Gases' (Policy paper prepared for the Pew Center on



allowances to participants without charge. Rather than auctioning allowances among potential participants and selling them to the highest bidder, this approach proves to be a realistic way to solicit enterprises' agreement to participation. A kind of precedent has been set for later programs through the free distribution. For instance, in the Jiangsu emissions trading program, although the local enforcers adopt a different allocation method, they still distribute the allowances to the power entities without charge.

In brief, although the Taiyuan experiment does not yield the desired outcome, there are certain accomplishments, as mentioned above, that deserve consideration. However, in view of the huge financial, personnel, and political resources invested in the demonstration program, it is somewhat disappointing to see the poor volume of trades and the less than encouraging performance of the market. Compared to the limited accomplishments, lessons learned from the Taiyuan project may bear more meaning to observers.

First, a tradable permit system has to interact and coexist with other policies and measures. This might lead to a situation, in which the permit system is made responsible for the failure of achieving the overall target even though, the responsibility for the failure lays with other participating parties.


Global Climate Change, 2003).

In the Taiyuan case, the local government set an ambitious SO₂ emissions reduction goal in 2001: it would decrease SO₂ emissions by 50 per cent below the 2000 level in 2005.¹⁴² There were very strong political considerations for the target-setting: the local administration intended to demonstrate their strong support for the Tenth-Five-Year Plan, in which the Central Government called for a nationwide 20 per cent reduction in SO₂ emissions from 2000 levels by 2005.¹⁴³ Taiyuan, as a city distinguished for its SO₂ pollution, was surely expected to bear more than the average responsibility for curbing the local emissions. The overly ambitious target was thus formulated as an indication of the local administrative team's political determination to fulfill the formidable task.

As always, initially, the pollution levy system was supposed to be

¹⁴² Some researchers also discussed the style of China's government in setting the goal for environmental protection. See for example, See Ruth Greenspan Bell, 'Choosing Environmental Policy Instruments in the Real World' (Paper presented at Concerted Action on Tradable Emissions Permits Country Forum, OECD Global Forum on Sustainable Development: Emissions Trading, Paris, 17-18 March, 2003).

¹⁴³ The Tenth Five-Year Plan was approved by the fourth meeting of the Ninth National Congress on 15 Mar 2001, available at: http://news.xinhuanet.com/misc/2005-10/07/content_3590248.htm (last visited on 3 July 2005).



the major instrument to achieve the goal. It worked well in 2001 and 2002 as the SO₂ emissions in Taiyuan decreased by more than 10 per cent from the 2000 level.¹⁴⁴ This was the period of time when Taiyuan was selected as the place to demonstrate a tradable permit system. The preparatory works were basically completed in 2001 and an emissions trading regime started to operate in 2002. The program seemed to run smoothly and the first reported trade took place in the same year. However, the situation changed dramatically in 2003 when the national energy demand surged. The highest amount ever of consumed fuel coal, along with the sharply increasing costs of purchasing coal, made abating SO₂ emissions as it usually would have been. The national SO₂ emissions continued to rise and reached a climax in 2005.¹⁴⁵ Taiyuan was not immune to this change. The local SO₂ emissions echoed the national trend and the city failed to meet the goal of 50 per cent reduction in 2005.¹⁴⁶

¹⁴⁴ Interview with an officer of the Taiyuan EPB (Telephone interview, 12 November 2004), interviewee remains anonymous as indicated.

¹⁴⁵ See Shengxian Zhou, 'Controlling China's Emissions Control Targets' (Speech delivered at the National Air Pollution Prevention and Control Conference, 30 May 2006), available at: http://www.zhb.gov.cn/xcyj/zwhb/200605/t20060530_76957.htm (last visited on 7 June 2006)

¹⁴⁶ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April

2006), interviewee remains anonymous as indicated.


Although much criticism was directed to the PLS for its failure to effectively collect fees from enterprises and induce them to change their behaviour, the ongoing emissions trading system also received unfavourable comments.¹⁴⁷ As the program suggested, the 26 participating firms' allowances for 2005 were allocated in accordance with their SO₂ emissions quotas in 2000–01, but in that year almost all the participants emitted much more SO₂ than the allowances they held for 2005.¹⁴⁸ Considering this, it is not surprising why no trade took place: no one had any surplus allowance to sell. The lack of real transactions still tarnishes the reputation of the tradable permit system, as people may wonder: why bother establishing such a program in China if it achieves nothing but simply adds another layer of complexity to SO₂ management and creates new rent-seeking opportunities?

However, it was not the tradable permit system's fault that no trade occurred in that year. A similar case that took place in a NO_x emissions trading program is the 2000 California electricity crisis, where

2006), interviewee remains anonymous as indicated.

¹⁴⁷ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.

¹⁴⁸ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.



energy demands increased dramatically and the enterprises needed more allowances to cover their actual emissions. In sharp contrast to the non-trade situation in the Taiyuan project, the emissions trading market in California was quite active and almost all enterprises bought the additional allowances they needed, though at an unprecedented high price.¹⁴⁹

The comparison of the two cases is instructive because it highlights the fact that trading demands strong supporting environmental institutions, such as reliable punitive mechanisms; and the emissions trading system by itself cannot fix the lack of requisite institutional factors in China. The government's slowness or inefficiency, at both the national and local level, in rectifying the deficiencies in the environmental institutions has contributed greatly to the embarrassing situation that emissions trading is entrapped in its application to China. As happened in the Taiyuan case, when unsatisfying results emerged, the tradable permit system may take unjustified blame if it is confused with an environmental target while actually being a policy tool.


¹⁴⁹ The NO_x credit prices increased from less than \$2000 a ton in 1999 to over \$70,000 a ton in 2000. See Ellerman, above n 141, 15 footnote 11; see also David Harrison, Jr., 'Ex Post Evaluation of the RECLAIM Emissions Trading Programmes for the Los Angeles Air Basin' in OECD (ed), *Tradable Permits: Policy Evaluation, Design and Reform* 45 (OECD, Paris, 2004).

Second, a related lesson concerns the fact that the integrity of a tradable permit system will be severely undermined if the goal is compromised by the regulated parties' plea for lenient treatment.

Realising the fact that they were unable to submit allowances equivalent to their actual emissions in 2005, the participants of the Taiyuan project cited the special market conditions of that year and negotiated with the local EPB for a liability exemption.¹⁵⁰ As will be discussed later, paying fines was not the major issue that worried the enterprises, because the fines set for breaching the enterprises individual cap were virtually trivial compared to their average abatement costs. What concerned the participants more was the shame they would bear should they be claimed to be violators of the law.¹⁵¹ Not surprisingly, almost all the participants were cleared of their liabilities. One primary reason why local EPB made such a lenient decision was that the environmental agency was required not to be too harsh on enterprises as they experienced "these unpredictable

¹⁵⁰ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.

¹⁵¹ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.



and unavoidable market changes".¹⁵²

Pressures on the local environmental regulators were coming from many sources, and concerns such as the firm's bottom line, taxing revenue, and fund distribution were very real. While it is hardly possible to determine what was going on in the enterprises management's mind when they realized they would suffer a great economic loss if they stuck strictly to the allowances allocated to them. Sensing the possibility of easing the goal of the program, as always happens, must have given them the reassurance to continue emitting SO₂ instead of taking effective abatement measures. The golden rule of "law does not punish the majority" (Fa Bu Ze Zhong) in China's political culture is perfectly reflected in the concerted actions of the participants in the Taiyuan program. They neither needed to scale down the production to offset SO₂ emissions as would be environmentally effective, nor did they have to face the request to purchase allowance to cover their additional emissions as would be encouraged in an efficient market.

However, had a tight cap and an efficient allowance market been in place, the case of "Taiyuan in 2005" would have been totally dif-


¹⁵² Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.

ferent. Conceptually, the increasing demand for more allowances will turn into a continual rise in the allowance price, and if sharp enough, a price shock as happened in the California electricity crisis may occur. Although the California case is far from perfect in many aspects and a number of factors need to be properly assessed for analysing purposes, the integrity of the program is assured by sticking strictly to the emissions cap.¹⁵³ Such stringency is exactly what is lacking in China's environmental regimes. Without adequate confidence in the regulators' determination to set a mandatory cap on the total emissions and vigorously enforce it as happened in the California case, the enterprises in China are bound to be sceptical and some may wait until the last minute to undertake their own responsibilities.¹⁵⁴

Thus, if the Chinese Government is interested in pursuing a realistic goal, rather than a figure selected by some inner councils working in somewhat of a vacuum, it should build explicit consultation with the potential participants and solicit as many of their opinions as possible. Enforcement is more likely to succeed if firms know what their real

¹⁵³ See in general David Harrison. Jr., 'Ex Post Evaluation of the RECLAIM Emissions Trading Programmes for the Los Angeles Air Basin' in OECD (ed), *Tradable Permits: Policy Evaluation, Design and Reform* 45 (OECD, Paris, 2004).

¹⁵⁴ Bell, 'Choosing Environmental Policy Instruments in the Real World', above n 142.



and actual targets are.¹⁵⁵ Setting a realistic target is the first, and maybe the foremost step in promoting an environmental protection regime in China, where the policy-makers have long favoured grand but often unachievable goals. Experience shows that an unreachable goal is worse than not having a goal: it will not only undermine the integrity of the program, but ruin the reputation of the regulatory instrument chosen to attain the program's target.¹⁵⁶

Third, another lesson drawn from the Taiyuan project relates to the urgent need for enhancing the local environmental agency's enforcement capability.

As the government institution that takes the primary responsibility for the administration of the program, the Taiyuan EPB was expected to be equipped with the requisite jurisdiction for vigorous enforcement of its requirements. However, the functioning of the program did not confirm this assumption. There are several factors explaining the less than adequate performance of the local environmental regulator.

Firstly, like any other local environmental organ, the Taiyuan EPB is not an independent body either


in a financial or a personnel sense. If an order issued by the Taiyuan EPB comes into conflict with certain major economic or political interests of the local parties, the environmental concern always concedes to the powerful economic or political clout. In 2005, when the local environmental authority found out that all the participants were in violation of the regulation because of the inability to submit the equivalent allowances for their SO₂ emissions, instead of simply enforcing the regulation and independently imposing fines, the Taiyuan EPB consulted the city government for instructions.¹⁵⁷ It may have disappointed advocates who held the pilot program in high regard, since the cap was not observed and the integrity of the program was undermined.

However, it would be unfair to criticize the local EPB for the failure in independently performing its duty without taking into account the practical concerns of the environmental agency. Obtaining the local government's strong support is essential. It would be much more shameful to the Taiyuan EPB if their issued orders were constantly ignored by the enterprises rather than turning to the city government in advance for advice.

¹⁵⁵ This statement proves to be reasonable in Western democracies. See, e.g., Bell, 'Choosing Environmental Policy Instruments in the Real World', above in 142.

¹⁵⁶ Ibid.

¹⁵⁷ Interview with an officer of the Taiyuan EPB (Telephone interview, 5 April 2006), interviewee remains anonymous as indicated.



Secondly, aside from the local patron's frequent intervention, the Taiyuan EPB's supervising power is also restricted in some areas by the provincial EPB. For instance, although the provincial EPB has stated strong support for the implementation of the demonstration in Taiyuan, it is still an intricate and critical issue for the Taiyuan environmental agency to deal with the relationship with its supervisor.¹⁵⁸ Hard times usually lead to normal things becoming suddenly complicated: When the power plants failed to submit sufficient allowances to cover its emissions in 2005, the Taiyuan EPB had to go through a much more difficult and time-consuming bureaucratic procedure to file an order, in which the provincial EPB's opinion was highly respected and clearly reflected.

Thirdly, the limited enforcement tools are not properly utilized by the Taiyuan EPB to ensure compliance. Collecting fees and imposing fines are the major instruments that enable the local environmental agencies to exert influence on enterprises. It is suggested that a steady, reliable message that the environmental requirements are serious and the administration in charge would consistently fulfil its

¹⁵⁸ Any senior staff shift in the provincial EPB would lead to certain change in their attitude towards the Taiyuan program, suggesting that the Taiyuan EPB has to make extra efforts to convince the new leader to support them.

duty must be sent to firms in order to change their behaviour.¹⁵⁹

The Taiyuan EPB is not immune to the low credibility in collecting fees or imposing fines that has plagued almost all of China's local environmental authorities. Many factors other than environmental concerns are evaluated by the local EPBs when they decide the financial treatments to emitting sources. Hence, if the fees or fines are set in accordance with the enterprises bargaining capacities, rather than their real emissions, the monetary instrument loses its credibility and sends no signal to alter the firms' behaviour. In effect, the PLS in Taiyuan acts more like a fund-raising measure than an incentive provider, because the fees or fines are never set at a level that either reflects the enterprises' real abatement cost or offers them sufficient economic incentives to reduce pollution.

These thoughts are also reflected in the case of installing CEMS in large stationary sources in Taiyuan. Although CEMS provide the most accurate measure to calculate enterprises' actual emissions, they are not always favoured by enterprises. Even with factories that have installed CEMS in Taiyuan, they have insisted on not connecting their CEMS to the local EPB's monitoring network so as not to expose the online emissions data to the local environmental authority.

¹⁵⁹ Bell, above n 142.

As previously discussed, it is not hard for the Taiyuan EPB to find that, apart from the fact that firms want to retain their bargaining abilities, the concern about high operating fees is the major reason that firms are reluctant to operate CEMS on a regular basis. While the enormous resistance from enterprises contributes to the slow building of the network connection between the sources and the regulators, the local EPB's ambiguous attitude in whether to accelerate the connection also merits attention. Instead of making such network connection mandatory, the ARET Taiyuan only requests the enterprises to periodically send data to the local EPB.¹⁶⁰

A bold assumption is that the local enforcer also worries about using their discretion in setting fees once the emissions data are fixed, which would leave smaller bargaining room for both parties and less rent-seeking opportunity for the environmental regulator to take advantage of the data uncertainty. In addition, it may not be as convenient as it used to be for the local EPB to adjust the annual environmental figures, whether requested by the local government or not, if the real emissions data are made available not only to them but also to the public through such network connections.¹⁶¹


¹⁶⁰ See, Article 19, *ARET Taiyuan*.

¹⁶¹ The chief executive of SEPA has realized the slowness in connecting the en-

Another enforcement tool that the Taiyuan EPB is equipped with is the right to recommend to the competent authority to shut down the plants if its emissions are causing imminent threat to communities. Since powering off a plant, even temporarily, always requires approval from local government and concerns other than environmental protection often take priority, such a tool is seldom used in regulating SO₂ emissions.

Nonetheless, attributing the failure in utilizing the available enforcement tools to effectively reduce

terprises' CEMS to the local EPBs, and perhaps the local enforcer's strong self-interests in the slowness. In a national speech given on 30 May 2006, he requested the local environmental agencies to take active action in building the network connections. And if the real emissions data is made available to the local EPB, it will be very hard not to conceal the data from the public, as the local EPB will be unable to ignore the increasing calls for more transparency in environmental issues from the public. See Zhou, 'Controlling China's Emissions Control Targets', above n 145. In addition, SEPA has recently issued the *Measures of Environmental Information Disclosure (Trial)*, which will take effect from 1 May 2008 and stipulated the responsibilities of the environmental agencies and enterprises to disclose their emissions information. This newly promoted regulation will enable the public to have more access to the pollution information and make it harder for the local EPBs to adjust the pollution data for their convenience. If properly implemented, it can be anticipated that the credibility of the enterprises emissions data will be greatly enhanced.



SO₂ emissions solely to the local regulator's incompetence is inappropriate; there are much more complicated institutional factors leading to the local EPB's poor performance. Such failure points out that it is essential to reform China's existing environmental institutions in a way that the local regulators can operate in a constructively independent sense. As demonstrated by the Taiyuan program, enhancing the local environmental authority's enforcement capacity is vital to ensure the compliance as well as the integrity of a tradable permits system.

Finally, one more lesson from the pilot case can be seen in the fact that the regulation passed by Taiyuan lacks effectiveness.¹⁶² Although the entities in violation will be fined RMB3000 (roughly US\$364, as of 4 March 2007) to RMB8000 (roughly US\$968) per ton of excess emission, the regulation sets a yearly cap of RMB30,000 (roughly US\$3630) on the total penalties, which undoubtedly falls far short of the violator's cost of compliance.¹⁶³ Moreover, there are few articles applying other civil and criminal penalties to participants if they, for instance, present fraudulent papers or faked emissions data.¹⁶⁴

¹⁶² Bell, 'Choosing Environmental Policy Instruments in the Real World', above n 142; see also Morgenstern et al., above n 135.

¹⁶³ See Article 23, *ARET Taiyuan*.

¹⁶⁴ Article 25 of the *ARET Taiyuan* only


The importance of putting adequate penalties in place, in whatever form is appropriate, has been proved beyond dispute by the existing experience with emissions trading in the US.¹⁶⁵ In the Taiyuan project, the regulator's failure to do so did not send a proper price signal to entities, which would have induced their compliance with the program. In 2005, when the participants faced the difficulty in whether to abate their SO₂ emissions to match the allowances they held, the minor financial punishment was obviously not the focus of their considerations.¹⁶⁶

Nonetheless, there are very realistic reasons leading to the legislator's choice. The RMB30,000 is the maximum amount that a city government can impose on a single

generally requests the local EPB to act in accordance with other relevant laws should any other violation occurs, but this vague language would not give enforcers much instruction as to how to fulfil its duty when such unnamed violation does take place.

¹⁶⁵ It is suggested the success of the US Acid Rain Program, the RECLAIM program, the Northeast NO_x budget trading depends to great measures on the existence of an effective punitive mechanisms. See for example, Ellerman et al., 'Emissions Trading in the US: Experience, Lessons and Considerations for Greenhouse Gases', above n 141.

¹⁶⁶ The RMB30,000 fine is trivial compared to the actual costs of reducing SO₂ emissions by almost all the firms in 2005. Even with the PLS in place, paying fines still became a more economic option for entities failing to submit sufficient allowances to cover their emissions.



civil environmental violation as stipulated by the Central Government¹⁶⁷ As such, it is beyond the Taiyuan government's capacity to fix the problem by itself. However, although the fines set in the Taiyuan regulation serve more than a nominal figure, they show the local EPB's determination to try everything within their power to equip the emissions trading program with financial incentives. It is highly unlikely for the State Council to grant the city administration special powers to dramatically raise certain fines for environmental concerns under China's political scenario. Therefore, it seems that a nationwide program, where the Central Government can set the uniform financial punishments at the central level and can delegate the enforcement rights to the local level, can better deal with the issue of inadequate penalties.

In summary, it is not surprising to see that the Taiyuan program experienced a problematic implementation and failed to yield the desired outcome expected of a market-based instrument. As some observers contend, the local environmental agency is still struggling with basic issues of how to ensure compliance with environmental requirements and how to achieve regulatory independence;¹⁶⁸ and

¹⁶⁷ Although the local EPB can argue how to define a "single violation", it is very difficult for them to put that into practice in view of the strong negotiating power of enterprises.

¹⁶⁸ See Morgenstern, et al., above n 135.

the basic institutional prerequisites and domestic motivation need further examination.¹⁶⁹ As a result, the accomplishments achieved are not as inspiring as the lessons drawn from the demonstration.

Although the Taiyuan project does not fully answer the question of whether emissions trading can survive in China, a country where a strong enforcement and compliance system is lacking, monitoring capacity remains weak, and state enterprises are the biggest polluters, the Taiyuan team's efforts are not invisible. They reflect the incremental nature of developing national environmental policies in China. It has been suggested that a tradable permits system would not be applied on a national scale until the Central Government determines that the local pilot programs have accrued sufficient experience. The Taiyuan demonstration has greatly enriched the needed experience in that sense.

Indeed, the accomplishments and lessons gleaned from the enforcement of this project are useful for the further application of emissions trading to China, as the participants in the Taiyuan projects indicate, "...they believe that this work has succeeded in developing the foundation for an effective and efficient SO₂ controls in Taiyuan and in advancing the emissions trading

¹⁶⁹ See Bell, 'Choosing Environmental Policy Instruments in the Real World', above n 142.



model to a point that other areas of Shanxi Province can adopt it."¹⁷⁰

¹⁷⁰ See Morgenstern, et al., above n 135.

4.3 CDM Experiences

As mentioned earlier,¹⁷¹ CDM is a voluntary project-based carbon emissions trading scheme open for developing and developed countries. Since the first CDM project in China, Huitengxile Wind farm Project of Inner Mongolia with credits purchased by the Dutch Government, was successfully registered by the CDM Executive Board in June 2005, China has dominated the global carbon market through participating in CDM projects and become the largest beneficiary. Further implications for China derive from the implementation of CDM projects for several years.

First, participants' enthusiasm, either voluntary or mandatory, is of great significance. Initially, Chinese enterprises knew little about the CDM and its implications for them. Guanghua Management College of Peking University conducted a CDM related questionnaire targeted at Chinese enterprises in 2000.¹⁷² The result showed that only a few Chi-

nese enterprises knew about the CDM and that they were not concerned about its influence. The main reason for the lack of understanding of the CDM at that time was that they did not know what benefits the CDM could bring to them. Subsequently, China's potential of implementing the CDM attracted developed countries to conduct CDM capacity building projects in China, which, to some extent, promote the development of the CDM in China and enhance CDM-related training and education for Chinese governmental officials and researchers. Nonetheless, the involvement and awareness of local private sectors, which are supposed to be the major players in the CDM, were neglected. At that time, there were few capacity building projects at an enterprise level, and the cooperation and communication on concrete CDM projects were rare. Consequently, most of the enterprises did not really understand the significance of the CDM, and thus did not participate in it.

Second, the Government should pay attention to the scopes of projects. The HFC-23¹⁷³ destruction

¹⁷¹ This part is adapted from Xiaoyi Jiang, *Legal Issues for Implementing the Clean Development Mechanism in China*, (Springer: Berlin), 2012.

¹⁷² *Chinese Enterprises' Understanding about the CDM* (Translation of 中国企业对CDM的理解, available on the Internet at cdm.ccchina.gov.cn/web/News-Info.asp?NewsId=41 (last accessed on 30 July 2010).

¹⁷³ HFC-23 (trifluoromethane) is generated as a waste gas in the manufacturing process of HCFC-22 which is a gas used as refrigerant and as feedstock, a raw material for other products. It has a global warming potential 11,700 times greater than CO₂. The UNFCCC and the



projects were very popular in China because they have a short cycle time and offer large volumes of credits for a low capital investment and mitigation cost and because the additional assessments are relatively straightforward. In addition, China is estimated to account for more than half of the global emissions of HFC-23.¹⁷⁴ Therefore, developing the HFC-23 CDM projects could bring industries more economic benefits than innovating technology to reduce HFC-23 emissions. Based on the above, most of the Chinese industries would rather apply for CDM projects with the current HFC-23 emission level than reduce it. However, there is limited potential for these projects as a significant proportion is already in the CDM pipeline and thus cannot bring long-term benefits to China. Facing this situation, China began to attach great importance to the energy sector, primarily renewable energy and energy efficiency.¹⁷⁵

Kyoto Protocol list the HFC-23 as a major potential GHG, and one of the first types of projects established under CDM was the investment in the destruction of the compound HFC-23.

¹⁷⁴ Jane Ellis, OECD and Sami Kamel, *Overcoming Barriers to Clean Development Mechanism Projects* (Paris: Organization for Economic Cooperation and Development and International Energy Agency, 2007), at 10.


¹⁷⁵ The Chinese government issued *Measures for the Operation and Management of CDM projects in China* in 2005. Article 4 of the *Measures* stipulates that "The priority areas for CDM projects in China are energy efficiency improvement, development and utilization of new and renewable energy, and methane recov-

The majority of registered and issued credits in China after 2007 began to be concentrated in the energy sector.

Third, the Measures for Emissions Trading play an important role in the carbon market. The Chinese Government issued Measures for the Operation and Management of CDM projects in China 25 (hereinafter referred to as the Measures), which is regarded as a basic regulation guiding the implementation of CDM projects in China. The Measures were issued in 2005 and were revised in 2011, adding a chapter of "Liability" to safeguard the smooth implementation of CDM projects.

Fourth, information disclosure is another concern. At the initial stage of implementing the CDM in China, there were participants claiming that some of the information on the carbon market was not available, making them lose the opportunity to find buyers and have confidence to implement CDM projects.

ery and utilization." In addition, the Chinese government imposes different ratios of tax to encourage the energy sectors. Article 24 of the *Measures* stipulates that "(1) the Government of China takes 65 per cent CER transfer benefit from HFC and PFC projects; (2) the Government of China takes 30 per cent CER transfer benefit from N2O project; (3) the Government of China takes 2 per cent CER transfer benefit from CDM projects in priority areas and forestation projects."



Fifth, another concern is Designated Operational Entities' (DOE) unsatisfactory performance. The emission reductions need to be certified by the DOE. The DOE plays an important role in developing CDM projects as it directly decides on the successful registration of a CDM project, on the successful issuance of emission reductions and on the quantity of CERs that can be issued. However, the current situation and problems of DOEs per se cause barriers to CDM projects in China. First, the current staffing of the DOE is too small to meet the need for the rapid processing of CDM projects. With the increase of CDM projects, the problems of a situation of insufficient staffing and asymmetrical information are compounded in the CDM EB. As a consequence, the CDM system relies on verifiers to verify the claim of the project developers, and many proposed CDM projects in China are delayed, waiting for validation from the DOEs. Moreover, the performance of the DOE is highly volatile and there are questions about the qualification of its staff.

Finally, a lack of indigenous DOEs makes it difficult to meet the demand for the rapid processing of Chinese CDM projects. Against the background of China having become the largest CDM credits supplier, most of the DOEs are from Europe and Japan and there are only 2 indigenous DOEs. According to the information released by the UNFCCC official website, although there are 7 entities from China ap-

plying for DOEs, only 2 entities got the approval by the EB among 48 DOEs.¹⁷⁶ One of the approved entities is the China Environmental United Certification Center Co., Ltd. (CEC) and the other is the China Quality Certification Center (CQC). As the first indigenous DOE, CEC spent nearly three years getting the approval from the EB in March 2009. The current situation impedes the development of Chinese CDM projects. Most of the international DOEs validate and verify Chinese CDM projects through their offices in China. Validation and verification processes are likely to be delayed due to the fact that the international DOEs are not familiar with China's national circumstances and that their offices have limited discretion. Furthermore, there is a language barrier for CDM owners in China in communicating with the international DOEs. If there were more qualified indigenous DOEs, these barriers would be overcome.

Sixth, the carbon trading related service industry needs to be regulated. The major barriers to CDM projects in China are attributed to the lack of expertise and the non-standard CDM-related service industry. As introduced previously, the CDM operational rules are extremely detailed and technical. The CDM project owners, on the contrary, usually do not have the cor-

¹⁷⁶ The list of DOEs is available at the UNFCCC website on the Internet at cdm.unfccc.int/Statistics/index.html (last accessed on 15 March 2011).



responding technical capacity and practical experience to implement CDM projects in China. Consequently, they tend to resort to the CDM related consulting service agencies. In this regard, the CDM-related service industry is deemed an indispensable part in the implementation of CDM projects in China. However, there is no professional standardization of the CDM-related service industry in China. Under this circumstance, the quality of its services and the qualification of its staff cannot be guaranteed, thus bringing about many barriers to CDM projects, e.g. a low CERs issuance rate and a great inconsistency between monitoring plan and operation in practice.

Facing this situation, the Important Declaration of Standardization of Consulting Service and Appraisal Work for CDM Projects in China was issued by the Office of the Committee in February 2006 (hereinafter referred to as the Declaration).¹⁷⁷ The Declaration is mainly aimed at regulating the behavior of the CDM-related service agencies, concluding contracts with project developers for direct sharing of CERs or the proceeds of transferred CERs with the project implementation and

other behaviours that violate the Measures. The CDM is developing rapidly in China, and it is an inevitable and long-term trend to reduce carbon emissions through carbon trading. In this scenario, it is necessary to enact a series of comprehensive and compulsory professional standards for the CDM-related service industry. The Declaration has limited binding effect in China (of low legal effect) and can no longer meet the demand of the development of CDM projects in China. Therefore, it is urgent and necessary to set up legitimate and legally binding standards for the CDM service industry with a view to regulating and ensuring the service quality of the CDM service as well as a highly qualified staff.

¹⁷⁷ *Important Declaration of Standardization of Consulting Service and Appraisal Work for CDM Projects in China 2006* (issued by the Office of the National Coordination Committee on Climate Change of the People's Republic of China), is available on the Internet at cdm.ccchina.gov.cn/UpFile/File630.PDF (last accessed on 15 March 2011).



4.4 Case Studies on ET of CO2

Voluntary Emissions Trading Schemes of CO2 have already been trailed, providing much experience. China launched a carbon emission trading system led by the China Beijing Environmental Exchange, Shanghai Environment Energy Exchange and Tianjin Climate Exchange, which were all set up in 2009.¹⁷⁸ Among them, Tianjin Climate Exchange is established as China's first comprehensive platform for enabling the transfer of credits for energy intensity, and aims to promote environmental protection and emission reduction by means of market and financial measures. While the traded unit was a carbon emission credit, it was created on the back of a local energy efficiency scheme. Furthermore, the China Beijing Environmental Exchange created China's first voluntary emission reduction standard, dubbed the "Panda Standard". It will certify domestic environmental projects across a variety of industries, including forestry and agriculture. This is likely to lead to the creation of a number of offsetting projects and new projects leading to new investment opportunities.

These exchanges build domestic platforms for carbon credit trade. From then on, overseas companies

can come to China and buy the carbon credit on the exchange. In the meantime, the public trading of carbon emission credit on the exchange could help China gain its pricing rights in the global carbon emissions market. On the other hand, China is a big user of carbon resources, but it is currently at the lower end of the carbon trading market, and its carbon finance market is relatively backward. Until now, China has been a seller of carbon credits, allowing western companies and nations to offset their emissions by buying up the credits generated by environmental schemes in China. Now the world's largest emitter of GHGs is likely to emerge as a big buyer of the credits. The potential value for a domestic trading market in China is about £125 billion a year, nearly twice that of the entire global carbon trading market, according to Standard & Poor's, the credit rating agency. This is because the country's rapid economic expansion implies it will continue to produce large amounts of emissions. China is currently on track to account for a third of global emissions by 2030. But so far these exchanges have only served as platforms for individual small scale deals.¹⁷⁹ China's first voluntary carbon trade was

¹⁷⁸ See, Shai Oster, 'China Expand Markets for Carbon Trading', *The Wall Street Journal* (The US), 11 November 2008, A11.

¹⁷⁹ *Tianjin Climate Exchange Launch Carbon Contract* (2009) China Tells <http://blog.chinatells.com/2009/09/1976> at 12 December 2009.



agreed in 2009, when Shanghai-based Tianping Auto Insurance purchased credits generated in Beijing during the Olympics through the deployment of a green commuting campaign where motorists could only drive on certain days. It is expected that the situation would

be changed as the Chinese Government has given clear signs of its approval and is drafting the Measures for Implementing a Voluntary emissions scheme in China.

5. Key Issues of CO2 ETS

Based on the above analyses and domestic and international circumstances, it can be concluded that it is of necessity and feasibility to implement CO2 ETS in China. Although China is undertaking a pilot


program in different regions and the future of China's ETS is still uncertain, there are some key issues needing to be clarified before considering the establishment of a nationwide carbon market in China.

5.1 Purposes and Principle

China is under considerable pressure to reduce carbon emissions without undermining its economy. Also, according to the other countries' experience and practice, the CO2 ETS have been proven to be a cost-effective tool to reduce emissions. Therefore, China attempts to establish a nationwide scheme for CO2 emissions trading in order to promote the reduction of CO2 emissions in a cost-effective and economically efficient manner. The objective of China's CO2 ETS is to put in place the necessary infrastructure and develop a dynamic domestic carbon market. In order to realize the objective, the current plan is to establish regional CO2 ETS targeted for certain industries by 2013 and subsequently,

to establish regional carbon markets targeted for key industries by 2015 and finally to set up a national carbon market commencing from 2015. Establishing China's emissions trading market shall be based on the following principles:

- The principle of openness, impartiality, fairness and public supervision;
- The principle of state guidance, adopting measures to local conditions and promoting outstanding features;
- The principle of steady progress and gradual development;
- The principle of combining government guidance and market regulation.




5.2 Mode of Emission Trading: “Cap and Trade” or “Baseline and Credit”?

According to the experience of CO₂ ETS, there are two modes of emission trading – “cap and trade” and “baseline and credit”. Under a cap and trade system, a government authority first sets a cap, deciding how much emissions in total will be allowed. Next, companies are allocated credits, essentially permits to emit, based on how large the companies are, what industries they work in, and so forth. If a company emits below its cap, it has extra credits which it may trade with other companies. For companies which emit below their caps, a cap and trade system is great, because they can sell their extra credits, profiting while reducing their emissions. For companies which cannot get their emissions under control, a cap and trade system penalizes them for their excess emissions while still bringing overall emissions rates down. In a sense, the need to purchase credits acts as a fine, encouraging companies to reduce their emissions.

In these baseline-and-credit plans there is no explicit cap on aggregate emissions. Instead, each firm has the right to emit a certain baseline level of emissions. This baseline may be derived from historical emissions or from a performance standard that specifies the permitted ratio of emissions to output. Companies create emission reduction credits by emitting fewer

than their baseline emissions. These credits may be banked or sold to companies who exceed their baselines. The effect is to limit aggregate emissions to an implicit cap equal to the sum of the individual baselines. Typical baseline-and-credit plans also differ from classic cap-and-trade in a number of institutional details. For example, credits are often computed on a project-by-project basis rather than on the basis of enterprise-wide emissions. They must be certified and registered before they can be traded and there are generally restrictions that credits cannot be registered until the emission reductions have actually occurred. In this regard, the baseline-and-credit is more complex than cap and trade in operation.

Based on China’s national circumstances and in accordance with the principles discussed above, it is appropriate to adopt a hybrid plan of combining “cap and trade” and “baseline and credit”, that is, the targeted industries included into ETS are divided into existing companies and new companies through setting a certain year. “Cap and trade” mode is adopted for existing companies and “baseline and credit” mode is adopted for new companies. The “baseline and credit” mode is to set a higher baseline level of emissions. The new companies create emission reduction



credits by emitting fewer than their baseline emissions and these credits may be banked or traded in the carbon market.

5.3 Targeted Industries

Three factors should be considered when discussing which industries would be covered by the China's ETS at current phase. They are China's economic development level, China's regional economic disparity as well as regional differences and emissions levels of various industries.


Based on the above mentioned factors, the China's ETS may covers CO₂ emissions from installations such as power stations, combustion

plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. Nitrous oxide emissions from certain processes are also covered. Thus, the target industries may include power industry, chemical industry, non-metal mineral processing industry, metallurgy industry, transportation equipments manufacture and etc.

5.4 Allocation of Emission Credits

The existing methods of allocation in the international carbon market include free allocation, auction and mixed allocation. Each method has disadvantages and advantages of their own. Free allocation method makes the large carbon emitters obtain emission rights free of charge, reducing economic efficiency and undermining market competition. The method of auction best ensures the efficiency, transparency and simplicity of the system and creates the greatest incentive for investments in a low-carbon economy. It best complies with the "polluter pays principle" and avoids giving windfall profits to

certain sectors that have passed on the notional cost of allowances to their customers despite receiving them for free. However, it also has shortcomings in that it increases production cost of companies and is prone to be resisted by companies. As the originator, for the three-year period beginning 1 January 2005, EU Member States allocated at least 95 per cent of the allowances free of charge and for the five-year period beginning 1 January 2008, EU Member State allocated at least 90 per cent of the allowances free of charge. The EU gradually transfers the method of free allocation to auction. From 2013 onwards, EU



Member States shall auction all allowances which are not allocated free of charge.

Therefore, the China's ETS would take the EU's example. Different regions would allocate all allowances free of charge by 2015. When a national ETS is set up,

China would allocate one part of the allowances free of charge and the ratios of allowances free of charge would be gradually reduced until all allowances are auctioned. Auctioning of allowances will become the basic principle for allocation.

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