



EMISSIONS TRADING IN CHINA



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Roger Raufer is an environmental engineer with more than thirty-five years experience in the energy field - especially in emissions trading (including a doctoral dissertation on this topic in 1984). He is a Senior Fellow at the Wharton School of the University of Pennsylvania, and teaches every summer at the Center for Economics & Management at the IFP School and IFP Training (IFP Energies nouvelles) in Rueil Malmaison, Paris. He formerly taught at Penn, and also worked at the United Nations in the Division for Sustainable Development in New York. Areas of expertise and experience are more fully described on my website.

Most Europeans (and certainly all IFP School alumni) are well aware of carbon trading under the Kyoto Protocol, and the international carbon market which was worth approximately €103 billion in 2009. The European Union's Emissions Trading Scheme (EU ETS) is the largest part of that market, representing about €89 billion. Many are also aware that China sells the most carbon credits into that market, under the Clean Development Mechanism (CDM) of the Kyoto Protocol. But fewer are aware of the role that a nascent emissions market may play in helping China meet its own domestic emissions targets – and this is a topic that I have been working on in China in recent years.



Beijing Sunset by Scott Meltzer

I was an emissions broker in the US in 1981 – long before the US introduced its ‘cap and trade’ program for acid rain, and even before there were significant international concerns about climate change. My first Chinese lectures about emissions trading took place in 1990, at Peking University and at the Chinese Research Academy for Environmental Sciences.

Later, in 1998, I was joined by Paula Coussy of IFP Energies nouvelles, and together we conducted a United Nations-funded training session in the city of Guiyang about economic regulatory measures and cost-benefit analysis. As part of that program we also ran a day-long computerized emissions trading simulation for power plants– one that many IFP School students also had a chance to experience during the late 1990s and early 2000s during my annual lecture visits to Rueil-Malmaison.

China introduced a number of early experiments with sulfur dioxide trading – notably an Asian Development Bank-funded effort in Taiyuan in the early 2000s. But it was only after they gained experience with CDM that they began to seriously consider using market mechanisms to address their significant environmental problems. The CDM experience with greenhouse gases led to the establishment of three emissions exchanges in the country later in that decade, in Beijing, Shanghai and Tianjin.



Hong Kong air quality

Earlier this year, the Chinese government made clear that it intended to use emissions trading as a mechanism to help achieve the energy intensity commitments it made under the Copenhagen Accord. At Copenhagen, China committed to reducing its carbon intensity by 40-45% by 2020, and in August 2010, it announced that eight cities (including Guiyang) would explore using market-based mechanisms to achieve these goals. Several other cities have previously announced that they were exploring emissions trading as well, or were in the process of establishing emissions exchanges.

Tianjin, one of the eight pilot cities, has already made considerable strides in this task. Tianjin's Climate Exchange is partially owned by same firm that owns the European Climate Exchange, and in February 2010, Citigroup Inc. and Russia's OAO Gazprom bought energy-intensity credits from three heating utilities that had surpassed efficiency targets. The energy savings were packaged as “carbon emissions allowances” that could be sold to other utilities or to buildings in the city that could not yet meet municipal goals.

I have been working with a number of Chinese exchanges in recent years. Earlier this year I assisted Beijing's exchange, the China Beijing Environment Exchange, in obtaining United Nations' funding to help upgrade their carbon trading platform (and also attended their ceremony in August 2009 announcing China's very first Voluntary Emissions Reduction [VER] transaction).



I've also served as a consultant to the Hong Kong Stock Exchange about 'emissions-related products' (including renewable energy certificates, 'white tag' energy efficiency certificates, as well as carbon and other pollutant instruments), and visited Shenzhen – another of the eight pilot cities – this past summer for discussions about the establishment of their new exchange.

Anyone who has worked on environmental issues in China or has closely followed the international climate negotiations knows that monitoring, reporting and verification (MRV) concerns are an important and contentious issue. The term itself has become quite value-laden, and the Chinese no longer use it in discussions; they refer instead to environmental and energy statistics measurement and evaluation (SME). Not surprisingly, my own efforts in China have addressed this area, and especially how one might apply technology to make emissions markets work within the country.

In a 2009 article in the journal *Energy* I laid out a "conceptual leapfrog approach" for emissions trading in China which had three component parts: 1) a real-time intermittent control system (ICS) strategy designed to address public health concerns in the near term; 2) software-oriented Predictive Emissions Monitoring systems (PEMS) targeting process parameter (rather than emissions) reporting from individual emission sources; and 3) real-time emissions markets responding to the ICS constraint.

The first component was based upon a similar approach used near major emission sources (e.g., power plants, smelters, etc.) in the 1960s and 1970s in the US and elsewhere, relying upon dispersion modeling and enhanced ambient monitoring to supplement – not replace – full time pollution controls. The second component relies upon control room information to replace (or, more likely in China, to audit) the continuous emissions monitoring equipment. And the third component – albeit a ways down the road, and representing a true 'leapfrog' for China – would be the use of real-time emissions markets linked to existing air quality.

Since the publication of the paper, I have also been working on enhancing the second component by using third-party energy/environmental monitoring, much like the company Genscape, Inc. does in the US and Europe, or EPA Solutions, Inc. does in the US and Canada. These third-party systems rely upon independent measurement of energy flows and emissions by using electric and magnetic field sensors, as well as infrared imaging and proprietary algorithms.

The key factor in all of these proposals is to use the combination of advanced, knowledge-based systems – dispersion modeling, real-time ambient monitoring; parametric and adaptive predictive emissions monitoring; emissions and allowance management information systems; computerized trading systems; etc. -- to supplement control efforts and to tackle the severe environmental conditions evident within the country. This exploits the radical transformation of computers, information and communications technology in recent decades, targeting them towards environmental improvements, and using them within a market-oriented framework.

There are obviously significant problems in implementing such approaches, and these have become readily evident in my work in the country. Such an information-rich approach is upsetting for China's historical governance structure, which treats energy and environmental data as "state secrets," and which has been hostile to outside efforts to upgrade MRV/SME.

But the scale of the problem makes the exploration of such approaches worthwhile. The reaction I received in 1990 in China about using emissions markets (or, for that matter, as an emissions broker in the US in 1981) was similarly dismissive – but look how quickly the world has changed! I very much look forward to sharing such research ideas, as well as our findings and progress in China, with IFP students over coming years.