Building trade in China

CARBON EMISSIONS TRADING CAN INCREASE ENERGY EFFICIENCY IN THE BUILDING SECTOR IN CHINA, SAY **KARLA LIEBERG**, **SANDRA GREINER** AND **ADRIAAN KORTHUIS**

China is exploring carbon emissions trading as an instrument to boost energy efficiency in buildings. Buildings are among the world's largest sources of greenhouse gas (GHG) emissions, responsible for more than 40 per cent of global energy use and around one third of global emissions. In rapidly developing countries, such as China, building-related emissions are fast growing due to increasing urbanisation rates and rising requirements towards living standards and comfort. Drastic measures to improve the energy performance in buildings and to pave the way for 'low-carbon cities' are needed, if the world is to move to a sustainable GHG trajectory.

The carbon market, so far, has played a miniscule role in providing incentives for energy efficient buildings. To date, national regulations in the form of building codes and standards have been the main instrument to enhance energy efficiency in buildings, followed by subsidy programmes and labelling initiatives. Progress is inhibited by the great diversity of building types, dispersed ownership, little overarching organisational capacity and the lack of suitable baseline and monitoring methodologies to determine emissions reductions.

In spite of these hurdles, emissions trading can provide an alternative. Monetising the carbon benefit from enhancing the energy efficiency in buildings is one way of channelling significant new sources of financing into the sector.

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The idea of extending emissions trading to buildings is currently being examined in a project between China's Ministry of Housing and Urban Rural Development (Mohurd) and Germany's Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The project forms part of a larger engagement of BMU activity in China to lower GHG emissions from buildings through its international climate initiative (see box, page 42).

Pilot study

In a pilot study for Mohurd and BMU, we have analysed the merits and basic options for implementation of such a scheme. Using emissions trading to incentivise energy efficiency in buildings is novel and not, at first glance, intuitive. Its advantages include:

- *Control:* The target amount of overall emissions from the sector can be set by the governing authority;
- *Cost-effectiveness*: Emission reductions can occur at least costs, as participants are able to exploit low-hanging fruits across the entire sector;
- *Transparency:* The costs of abatement in the sector become visible and comparable;
- *Dynamic incentive:* Capped participants have a continuous incentive to lower their emissions, either to stay within their allocated budget of allowances or to be able to sell excess allowances to other participants;
- *Integrability:* An emissions trading scheme (ETS) fits well into the global climate change architecture and can be linked to international or regional carbon markets or to other forms of international climate financing; and
- *Experience:* China, in particular, has embraced the idea of carbon trade and has been tremendously successful in implementing and benefitting from the Kyoto protocol's clean development mechanism (CDM). There are several domestic trading initiatives in China to which the scheme could be linked.

On the downside, the complexity of the trade, high demands on infrastructure, unpredictable price developments, a questionable effect of the price mechanism and potential windfall profits require a thorough assessment of potential design features.

Emissions trading has worked well capping the emissions of large direct emitters in industry and energy generation, for instance, in the EU ETS. There is a contrast between the sophistication of the trade and high requirements on monitoring and verification and the scattered nature of emissions related to buildings. Bringing the two together is a challenge. In the pilot study, several options have been identified for a meaningful trading scheme covering buildings.

Implementation options identified in the study fall into two groups: those where tradable allowances are issued beforehand to a group of participants that control a portfolio

of buildings (cap-and-trade); and those where credits are rewarded to entities that lower emissions in the building sector against a certain baseline (baseline-and-credit) and where credits can be used as offsets in other trading schemes. The latter most closely resembles the CDM.

Cap-and-trade

A precondition for cap-and-trade is that entities control sufficiently large portfolios of buildings with meaningful amounts of associated emissions. These entities have to be sophisticated enough to participate in trade. This prerequisite rules out individual homeowners and occupants. Large enough entities include utilities and district heating companies that provide heat and electricity to many buildings. These companies could receive a target to implement energy efficiency enhancements equivalent to a certain percentage of their delivered energy.

Energy efficiency measures can either be carried out by the utilities and district heating companies themselves, or they can acquire certificates generated from carbon savings elsewhere in the building sector from third parties (so-called white certificates). A few precedents for the trade in energy efficiency measures exist in pilot regions in Europe and the US. The approach is similar to the more common renewable portfolio standards, whereby generators of electricity are required to generate a certain percentage from renewable energy or purchase tradable renewable energy certificates.

A cap-and-trade scheme can also target project developers and encourage the building of more energy efficient buildings. Usually building developers choose materials and

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design in order to optimise the profit margin between costs and sales price. The building developer faces little incentive to accept the higher costs for building in a more energy efficient way: after all they will not have the benefit of lower energy bills later on. Under a cap-and-trade system for new buildings, developers would have to surrender allowances commensurate with the emissions the building creates over a certain time period. As allowances have to be purchased, low-energy performance levels are reflected in higher costs.

A similar approach could also be used to incentivise energy efficiency enhancements in existing buildings by imposing an emissions reduction target on building owners. This can be especially meaningful where higher energy efficiency is not stimulated by lower energy bills, for example, if buildings are rented out. There are several barriers to the implementation of a cap-and-trade system on existing buildings, the most important being the diverse ownership and management structures. In China*, public buildings are a suitable segment as they are owned by single entities. Public buildings are often large; in China about 10 per cent of public buildings measure over 20,000 square metres and thus constitute a sizeable source of carbon emissions.

Baseline-and-credit

Under baseline-and-credit, project developers receive credits for realising buildings with superior energy efficiency performance that outperform a certain baseline. To streamline the application, a sectoral crediting baseline should be defined ex ante.

Unlike cap-and-trade, participation in the scheme is voluntary and open to whichever entity wishes to implement energy efficiency measures. Suitable candidates are energy service companies with experience in identifying, implementing and financing such measures. Other actors can be banks with energy efficiency loan programmes, as well as utilities and district heating companies.

As this scheme only rewards project developers and no punishments, external sources of finance and external buyers of carbon credits are needed. In order to secure demand, energy efficiency measures in buildings can be integrated as an offset category into voluntary or mandatory cap-and-trade schemes. Plausible links include one to a national compliance scheme that involves large Chinese emitters, or to a system outside China, such as the EU ETS. Other performance-based payments from international sources of climate change funding are also possible, such as under the concept of nationally appropriate mitigation actions (Namas).

China has a functioning system for hosting CDM, which can form a valuable basis for the implementation of a domestic trading scheme. Such a scheme can also be linked to other initiatives, such as the voluntary cap-and-trade system at the Tianjin Environmental Exchange. Still, there is a long way to go before credits from the building sector can be traded. Capacities are needed for the monitoring, verification and issuance of credits, the organisation of the trade, the allocation of allowances and the enforcement of targets.

The main barrier is the determination of targets under cap-and-trade or of baselines under baseline-and-credit, as these require a thorough assessment of current and forecasted performance levels, current and future technology solutions and market developments. Furthermore, differences between buildings in energy performance have to be taken into account. Models to calculate energy efficiency and the stratification of buildings can help to overcome this.

The Mohurd is evaluating different options for a domestic trading system and will determine a pilot region for a case study. The nationwide implementation is still a distant prospect, but local initiatives for the pilot implementation of trading systems for credits from the building sector will be an interesting first step. ●

** According to the Chinese standard GB 50189-2005, public buildings include offices, hospitals, shopping centres, government offices, schools, hotels, cinemas, library, restaurants and passenger traffic buildings and others*

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Background to the study

The Delegation of German Industry and Commerce Beijing commissioned Climate Focus and the Institute for Urban and Environmental Studies of the China Academy of Social Science to prepare a comprehensive study on 'Energy efficiency in the Chinese building sector: models for certification and trading'. The study is supported both financially and through technical discussions by Germany's Ministry of Environment, Nature Conservation and Nuclear Safety (BMU) under the its international climate initiative. The background to the study is the wider engagement of the BMU in China supporting energy efficiency enhancements in the building sector through carbon market-related instruments.

The BMU also supports the Research Center for International Environmental Economics at Tsinghua University to develop a methodology for programmatic clean development mechanism (CDM) for new buildings in China. It is also financing a project that analyses and implements programmatic CDM and sectoral approaches for new buildings in the country. Climate Focus was commissioned to deepen the research on the trading platform and to establish a pilot emissions trading scheme.