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Future options for a sectoral approach to the Clean Development Mechanism of the Kyoto-Protocol: the example of the Chinese Power sector

(DIPLOMARBEIT)

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Abstract

Within the coming decades, China is expected to become the world's largest emitter of Greenhouse Gases (GHG). To maintain climate stability, it will be crucial to include China and other major developing countries in a climate regime post 2012.

So far, the Clean Development Mechanism (CDM) of the Kyoto Protocol represents the only instrument to integrate developing countries into GHG mitigation. Recently, there has been a discussion on widening the scope of the CDM: from a project-based to a sectoral approach. The objective of the new approach is to stimulated climate friendly policies or programmes, instead of isolated projects.

A sectoral approach is believed to be better able to contribute to sustainable development in host countries and to GHG mitigation – both representing the dual objective of the CDM.

In this thesis, a sectoral, or policy-based, approach is confronted with the reality of CDM implementation in the Chinese power sector.

In a first step, shortcomings of the current CDM are identified. Then, the ability of a policy-based approach to overcome these shortcomings is evaluated. The question is, whether a sectoral CDM is more capable to contribute to the objectives of the mechanism.

Eventually, this thesis concludes that a sectoral approach has the capability to overcome some shortcomings of the current CDM in the Chinese power sector – but serious barriers remain.

However, even though there is not a clear answer to the general question, conclusions can be drawn for the future design of a sectoral CDM. These conclusions provide an input for the future discussion on the design of the mechanism.

- A sectoral CDM should be complemented by an instrument to support research and development. While a policy-based approach is able to provide an incentive for the localisation of existing technologies, it offers no direct incentive for the development of new technologies. This has to be compensated.
- The enforcement of already existing policies should be made eligible as a project activity under a sectoral CDM. This would strengthen the environmental effectiveness of the instrument, as China (as other developing

countries) faces serious problems in law enforcement. A policy-based CDM could not only provide an incentive to adopt new policies, but also to actually implement existing ones.

- As a consequence, additionality of policies should not be considered. Instead, sectoral (or even national) baselines should fall well below the business-as-usual scenario to guarantee the environmental integrity of the mechanism. After all, the motivation for adopting a policy is not important – as long as it contributes to GHG reductions.
- A sectoral CDM should only be a complement to the existing project-based CDM. The project-based mechanism has a number of advantages, in particular in a political system with weak law-enforcement.

Of course, it is important to keep in mind that these conclusions have solely been drawn from the Chinese example. Further research is needed to assess their viability in the context of other developing countries.

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Glossary

ACM	Approved Consolidated Methodology
AIJ	Actions Implemented Jointly
AWG	Ad Hoc Working Group on Further Commitments for Annex I Parties
CASS	Chinese Academy of Social Science
CCS	Carbon Capture and Sequestration
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon Dioxide
CO_2e	Equivalent of Carbon Dioxide
COP	Conference of Parties to the UNFCCC
COP/MOP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ERI	Energy Research Institute (of the NDRC)
FDI	Foreign Direct Investment
FYP	Five-Year-Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GTZ	Gesellschaft für Technische Zusammenarbeit, German Development Co-operation
GW	Gigawatt
GWP	Global Warming Potential
HCFC-22	Chlorodifluoromethane
HFC-23	Trifluoromethane

IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
kW	Kilowatt
Mtce	Million Tons of Coal Equivalent
Mtoe	Million Tons of Oil Equivalent
MW	Megawatt
NCCCC	National Co-ordination Committee for Climate Change
NDRC	National Development and Reform Commission
N_2O	Nitrous oxide
OECD	Organisation for Economic Cooperation and Development
PDD	Project Design Document
ppm	Parts Per Million
RAG	Ruhrkohle AG
SB	Subsidiary Bodies of the UNFCCC
SEPA	State Environmental Protection Agency
SSC	Small-Scale Project Activities
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

1.1 Background

When the Kyoto Protocol entered into force in February 2005, the international climate community was enthusiastic. Despite continuous political turmoil and against all odds, the Protocol had finally become legally binding, obliging 42 developed countries to reduce Greenhouse Gas (GHG) emissions.

The entering into force also paved the way for formal negotiations on the future of the climate regime. Official talks on a second commitment period post 2012 started in December 2005 at COP/MOP1 in Montreal. At this point, the initial enthusiasm gave way to the insight that much greater challenges lie ahead.

To maintain climate stability and to prevent dangerous anthropogenic climate change, much stronger reductions are needed. Indeed, the Intergovernmental Panel on Climate Change concludes that significant reductions are needed beyond 2012 (IPCC 2001: 119). However, and even though the Kyoto-Protocol stimulates a 5,2% reduction of GHG emissions in developed countries from 1990 to 2012, global emissions are expected to grow significantly in the same period: the International Energy Agency projects that global energy-related CO_2-emissions alone will be 39% higher in 2010 than in 1990 (IEA 2004: 74).

The share of developing countries to emission growth increases rapidly. In particular, energy intensive sectors in China, Brazil and India are playing an increasingly important role, as their national economies continue to grow swiftly.

As a consequence, GHG emissions of major developing countries cannot be ignored in the future. To maintain global climate stability, these countries will also have to make a contribution to global mitigation efforts. As highlighted by the United Nations Framework Convention on Climate Change, this contribution has to be based on the principle of “common but differentiated responsibilities”.[1]

Thus, one of the key questions for climate negotiations is how to integrate major developing countries in a future climate regime.

The Clean Development Mechanism (CDM) of the Kyoto-Protocol is currently the only way to include developing countries into global mitigation efforts. Indeed, this

[1] United Nations Framework Convention on Climate Change, Article 3.1

mechanism has been praised as the most important and innovative among the flexible instruments of the Kyoto-Protocol.

The CDM is a co-operation mechanism intended to offset emission reductions of developed countries through the implementation of climate friendly projects in developing countries. At the same time, the CDM is expected to contribute to the decarbonisation of national economies. Indeed, one of its objective's consists in achieving sustainable development in host countries.

In practice, though, the CDM falls short of its expectations. Although the number of projects is increasing rapidly, their contribution to sustainable development remains limited (Michaelowa 2005). What is more, there is unanimity that the CDM has not contributed to the decarbonisation of key sectors in a significant way.

This shortcoming has led to a discussion on the future of the CDM. There is a lot of criticism of the existing rules and numerous calls for improvement. Various new options for the CDM are under discussion.

The most promising and widely discussed approach is the so-called "sectoral CDM". It has been modelled upon the need to enhance the ability of the CDM to trigger sectoral transformation. This approach would change the basic functioning of the CDM: instead of stimulating isolated projects, a sectoral CDM would be a top-down approach, run by governments. Sector-wide policies, programmes or standards would qualify as project activities.

Up until 2005, sectoral approaches had only been discussed in an academic sphere (Samaniago and Figueres 2002, Bodansky et al. 2004, Bosi and Ellis 2005, Coseby et al. 2005). Its pros and cons were addressed at a fundamental level, building upon the experiences with CDM implementation.

But the debate has now entered the political arena as well: sectoral approaches were discussed in December 2005 at COP/MOP1 in Montreal and in May 2006 at the first meeting of the Ad Hoc Working Group on Further Commitments for Annex I Parties[2] under the Kyoto Protocol (AWG) in Bonn. As the debate enters the sphere of concrete negotiations, more practical questions have to be addressed. So far, the academic debate has not been able to deliver this.

[2] In this thesis, I am going to refer to Annex I countries as the countries listed in Annex I of the UNFCCC. I will use the term "developed" countries in synonym with "Annex I countries". Accordingly, the term "developing countries" is used in synonym with "non-Annex I countries".

With this thesis, I will try to make a very first step towards a more practical discussion of sectoral approaches to the CDM. Instead of evaluating the theoretical merits of the mechanism, I am going to apply it to a concrete example: the Chinese power sector. Eventually, I hope that this discussion will provide further insights for the overall debate of sectoral approaches to the CDM.

I have chosen the case of the Chinese power sector because China is by far the most important developing country in terms of GHG emissions: it is the world's most populous country, the second largest economy and the second largest consumer of primary energy after the United States. China is the world's second largest emitter of GHG emissions (IEA 2004: 263).

According to the reference scenario of the International Energy Agency, China's annual emissions alone will climb by 3.837 million tonnes by 2030, equal to more than a quarter of the increase in world emissions. Strong economic growth and heavy reliance on coal in industry and power generation drive this trend (ibid: 77).

The energy sector plays a crucial role in China. It contributed to 76% of total GHG emissions in 1994 (National Communication 2004: 5). It is the largest domestic source of carbon emissions and offers vast opportunities for carbon reductions: in the short-run, increasing efficiency and fuel switching could contribute to lower emissions; in the medium and long run the development of decentralised, carbon-free energy systems could change path-dependency altogether.

Hence, to maintain global climate stability, it will be imperative to include China's power sector into future GHG mitigation efforts.

1.2 Research question and hypotheses

My basic question is whether a sectoral approach to the CDM is better capable to achieve the objectives of the mechanism than the "old" mechanism.

To answer this question, I obviously need to introduce its objectives first. I will present them in Chapter 2, where I will argue that decarbonisation of key sectors is one of the main goals of the CDM.

However, I do not want to discuss the *theoretical* ability of a sectoral CDM to meet the objectives of the mechanism. Instead, as I have indicated already, I seek to make a more *practical* contribution to the debate. Hence I will discuss the sectoral approach using an example, the Chinese power sector.

In this sector, the current CDM has failed to meet both the objectives and the potential of the mechanism. As the sectoral CDM has been designed as an evolution of the current CDM, it should be able to overcome the problems the CDM faces in practice. As a consequence, it should also be more capable to meet the original objectives of the CDM. Thus, the political feasibility of the mechanism is of key importance.

This is my basic approach: I will evaluate the prospects of the sectoral CDM on the basis of the current CDM implementation in China.

The initially introduced research question has to be specified accordingly. Now, it reads as follows:

> *Can a sectoral CDM overcome the shortcomings of the current CDM in the Chinese power sector; and can a sectoral approach better contribute to the decarbonisation of this sector?*

To answer the research question, I am going to build upon a number of hypotheses:

1. *Because of projected growth, the integration of the Chinese power sector into global GHG mitigation efforts is imperative.*
2. *The current CDM fails to meet its objectives in the Chinese power sector. It neither contributes to sustainable development, nor does it trigger sectoral transformation towards more climate friendly energy production.*
3. *National implementation in China constitutes serious barriers for the CDM.*
4. *A sectoral CDM needs to be able to overcome these barriers, in order to achieve the original objectives of the mechanism.*

In the course of this study, I will test these hypotheses. I will also add a fifth hypothesis in Chapter 4, which emerged at that stage of my research:

5. *A sectoral CDM also needs to be in accordance with China's priorities in domestic energy politics as well as with its principles in international climate negotiations.*

With this hypothesis, I am going to broaden the basis for the evaluation of a sectoral CDM.

1.3 Methodology and content

As a basis for my study, I first need to develop a comprehensive model of a sectoral CDM. Second, I will evaluate the implementation of the current CDM in China. After these basic steps I will be able to evaluate the prospects of a sectoral approach.

First, to develop a sectoral approach to the CDM, I will discuss the existing academic literature in Chapter 2. There are a number of proposals for a sectoral CDM, and I will derive a comprehensive model on their basis. I will also introduce the basic functioning and the objectives of the current CDM in this chapter.

Second, to discuss the implementation of the current CDM in China, I will not be able to dwell on academic literature. There are very few studies available, and the few existing ones are out of date (Oberheitmann 1999, Zhao and Michaelowa 2004).

As a consequence, I have to depend on primary literature and on own data gathering. In order to provide an ample basis for the evaluation of CDM implementation in China, I therefore conducted 22 semi-structured expert-interviews from 27 March to 1 June 2006 in Beijing, China. Interviewees represented key stakeholders, including senior governmental officials, researchers, international donors and business representatives. The methodology applied for the interviews is discussed in greater detail in Chapter 3.

Based on these interviews, I am going to discuss the implementation of the current CDM in Chapter 4. In this Chapter I will also introduce the Chinese power sector and the theoretical potential of the CDM within this sector. I will verify the first two hypotheses.

Using this as a basis, I will identify a number of barriers to CDM implementation in Chapter 5, thus testing the third hypothesis.

In Chapter 6, I will evaluate the ability of a sectoral CDM to overcome the barriers identified (in accordance with the fourth hypothesis). I will also discuss the prospects of the approach in light of the implications of the barriers, and the principle considerations of the Chinese government. This chapter is key to answer the research question.

Finally, Chapter 7 will summarize the discussion and draw general conclusions for the prospects of a sectoral CDM.

2. Developing a sectoral CDM

In this Chapter, I intend to introduce the basic functioning and the objectives of the CDM, as well as key issues related to its implementation. I will also present the rationale for a sectoral approach to the CDM and develop a design of a policy-based approach.

The chapter sets out the basics for the later discussion of CDM implementation in China and the prospects of a policy-based CDM to improve that implementation.

2.1 Introduction to the Clean Development Mechanism

In a first step, I am going to introduce the CDM and its objectives.

2.1.1 Objectives

The CDM is one of the three flexible mechanisms of the Kyoto Protocol. For developing countries, which are not facing emission reduction commitments themselves, it is the only way to become directly involved in the implementation of the Kyoto Protocol.

The Kyoto Protocol defines the objectives of the CDM in article 12: "*the purpose of the clean development mechanism shall be*

1. *to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and*
2. *to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3*." [3]

Thus, the CDM has a dual objective. It shall help developed countries in achieving their emission reductions and contribute to sustainable development in developing countries at the same time.

On the one hand, this reflects the need of Annex I countries to comply with their commitments in a more flexible and cost-effective manner. On the other, it reflects the hopes of non-Annex I countries that the mechanism would help to sustain and enhance economic development, improve energy efficiency and contribute to a cleaner environment for their citizens (Coseby et al. 2005: 5).

[3] Numbers added by the author.

However, the Kyoto Protocol left many practical questions on the implementation of the mechanism open. After the international community agreed on the CDM as part of the Protocol in 1997, it took five more years of fierce negotiations to agree upon concrete measures for CDM implementation. The final agreement was reached at COP7 in Marrakesh, 2001. The “Modalities and Procedures for a Clean Development Mechanism” (Decision 17/CP.7), the so-called “Marrakesh Accords” finally paved the way for practical implementation of the mechanism. Still, to become legally binding, the Marrakesh Accords had to be approved by the first Meeting of the Parties to the Kyoto-Protocol, which happened in December 2005 in Montreal at COP/MOP 1.

Key provisions of the Marrakesh Accords include:

- It is the host country’s prerogative to determine whether a CDM project assists in its achievement of sustainable development. (Decision 17/CP.7, paragraph 5)
- Public funding for CDM projects should not result in a diversion of official development assistance. (Decision 17/CP.7, preamble)
- CDM projects should lead to the transfer of environmentally safe and sound technology and know-how. (Decision 17/CP.7, paragraph 8)

These provisions illustrate both the hopes and fears of developing countries as regards the CDM. They ensure both that host countries have full control over the decision of whether a project is eligible for the CDM, and that Annex I countries use additional financial resources. Finally, they emphasise the key role of technology transfer.

2.1.2 Historic roots

There are two historic perspectives to explain the origins of the CDM. Each highlights different aspects of the mechanism: one stresses the transfer of resources from North to South; the other stresses the notion of cost-effectiveness.

According to the first perspective, the origins of the CDM can be traced down to the drafting of the United Nations Framework Convention on Climate Change (Figueres 2006: 2). Norway introduced the idea of “Joint Implementation” (JI), a mechanism of multilateral implementation. At this time (and in contrast to today’s JI under the Kyoto-Protocol), JI was a broad concept of a global emission-trading scheme. Its main goal was to reduce mitigation costs (ibid.).

Eventually, JI was integrated in Article 4.2 of the UNFCCC:

> *… Parties may implement such policies and measures jointly with other Parties …*

However, developing countries suspected joint implementation to be a loophole for developed countries, offering them a chance to buy themselves out of mitigation commitments (Figueres 2006: 2).

This culminated in a pilot phase for the mechanism, which was agreed upon at COP1 in 1995. Now, the mechanism was labelled "Actions Implemented Jointly" (AIJ). It was evaluated at COP5 in 1997, where many governments were dissatisfied (ibid: 3). Following this interpretation by Figueres, this evaluation of AIJ represented the basis for the Brazilian proposal of a "Clean Development Fund".

This first perspective calls attention upon the aspect of cost-effectiveness, which has always been at the core of the mechanism. The historical importance of cost-effectiveness in climate negotiations is also reflected by Article 3.3 of the UNFCCC:

> *… taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost …*

In this context, the concept of cost-effectiveness needs some elaboration, although this thesis cannot provide the space for an in-depth discussion.

Following classical economic theory, an environmental measure is cost-effective when the marginal cost of control is equal to the marginal cost of the pollution of each emitter (Tietenberg 2006).[4] An important prerequisite for achieving cost-effectiveness is the flexibility of market actors to choose where emission reductions are realized (Loske 1997: 169).

In the international climate regime, this flexibility is provided by the CDM. In the context of the CDM, the notion of cost-effectiveness is guided by the assumption that abatement costs differ from country to country. This, in turn, is based upon the assumption that different available technologies cause different costs (Loske 1997: 169).

[4] I do not want to discuss the related theoretical backgrounds in detail, but it should be noted that this theory cannot easily be applied to reality. E.g., it assumes a system of perfect information of all market participants.

The fact that international co-operation facilitates cost-effective emission reductions that lower mitigation costs is also acknowledged by the IPCC (2001: 24).

According to the second historical perspective, the CDM was intended as a purely financial instrument to facilitate the transfer of resources from North to South.

The initial idea was presented at COP6 by Brazil: the Brazilian negotiators proposed the creation of a "Clean Development *Fund*" (Oberthür and Ott: 1999: 221). According to this proposal, developed countries should pay into a fund if they fail to meet their emission reduction commitments. The fund should be used to finance adaptation and mitigation measures in developing countries.

At large, developed countries opposed the idea to create a mechanism for the transfer of resources from North to South (ibid.). Nevertheless, the USA started bilateral negotiations with Brazil, and eventually succeeded in changing the design of the mechanism. Rather than a penalty for non-compliance, the mechanism was re-designed to prevent any failure of performance of developed countries: jointly achieved emission reductions should be credited and used to meet the commitments (ibid.). The *Clean Development Mechanism* was born.

As already mentioned above, both aspects can still be found in the CDM. The mechanism grants developed countries some flexibility in achieving their reduction commitments; at the same time it is intended to support sustainable development in developing countries.

2.1.3 Practical implementation

In practise, the CDM enables Annex I countries to carry out GHG mitigation projects in non-Annex I countries. The emission reductions achieved through these projects are certified; Annex I countries are allowed to use these so-called "certified emission reductions" (CERs) to fulfil their national commitments under the Kyoto Protocol. The reductions have to be achieved on a project-by-project level. Companies are intended to be the main actors; they are developing and implementing CDM projects.

Since non-Annex I countries do not face reduction commitments, the total emission budget of the Kyoto Protocol is increased by the generation of CERs. Therefore, to safeguard the environmental integrity of the Protocol, it is crucial that each CER represents an actual and verified reduction of CO_2 equivalent – and that the reductions are additional compared to a business-as-usual or baseline scenario. This

shall ensure that in the end the factual emissions are not increased, although the nominal emission budget has grown.

This highly abstract concept requires elaborate and complex rules for implementation. The Marrakesh Accords provide clarification:

> *A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.* (Decision 17.CP/7, paragraph 43*)*

In order to determine the reductions, a baseline has to be set up, which represents the GHG emissions in absence of the project. The reductions of any project will be measured by substracting its emissions against the baseline scenario.

Hence, emission reductions or carbon sequestration achieved by CDM projects are not intended to achieve additional emission reductions, but to offset emissions of Annex I countries (Sterk and Wittneben 2006: 7).

The baseline is calculated according to a certain methodology, which has to be approved by international CDM Executive Board. Once approved, the methodology can be used by other projects as well (Decision 17.CP/7).

On the institutional side, the Marrakesh Accords set up a governing body for the CDM, the Executive Board (EB). This body is responsible for supervising the entire CDM cycle; it represents a focal point for all CDM related activities on an international level. Its main tasks are to approve projects and methodologies, to provide guidance on CDM rules, to issue CERs, and to accredit so-called designated operational entities (DOEs). In addition, the EB has a number of reporting responsibilities. The EB is fully accountable to the COP/MOP, which remains the highest authority in the field of the CDM. (“Role of the Executive Board”, Decision 17/CP.7.)

The EB set up a number of special panels and working groups, which deal with technical or methodological issues. The most important of them is the “Meth Panel”, which reviews methodologies and gives recommendations for their approval (Decision 17/CP.7.).

The already mentioned DOEs play a crucial role for project approval. The DOEs certify projects, which is a prerequisite for the issuance of CERs through the EB. The DOEs themselves have to be certified according to rules set out in the Marrakesh Accords (“Procedure for accrediting operational entities by the EB of the CDM”).

Before CERs are issued, each CDM project needs to undergo a complex project cycle. This cycle starts with the preparation of a Project Design Document (PDD) by the project proponents. The PDD is a comprehensive description of the project, including information on the baseline, additionality, and monitoring. Important steps in the project cycle are the approval by the host country, the validation of the PDD through a DOE, registration of the project with the EB, monitoring, implementation and finally the issuance of CERs by the EB (Decision 17/CP.7.). A detailed description of the project cycle can e.g. be found in Sterk and Wittneben 2006.

It is important to note that the CDM rules are dynamic. Although the Executive Board cannot change the basic rules (this is the prerogative of the COP/MOP), it issues "clarifications" of existing rules. If the original rules are rather vague, this can lead to considerable changes.[5]

2.2 Shortcomings of the Clean Development Mechanism

At first glance, CDM implementation seems to be a success story: in June, the climate secretariat announced that CDM will have generated more than 1 billion CERs by 2012. This amount corresponds to the annual emissions of Spain and the United Kingdom combined (Press Release UNFCCC: June 9, 2006). Nevertheless, as the number of expected CERs and projects is growing, an increasing number of voices are calling for improvements of the way the CDM works (Sterk and Wittneben 2006: 1).

2.2.1 Sectoral transformation

According to the text of Article 12 of the Kyoto Protocol, the CDM shall not only assist non-Annex I countries to achieve sustainable development, but "*in contributing to the ultimate objective of the Convention*", i.e. "*to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*" (Art. 2 UNFCCC). In contrast to the interpretation presented above, this could be regarded as a third objective of the CDM.

This "third objective" clearly indicates that CDM implementation should contribute to the stabilisation of emission concentrations. Since the generated CERs will solely

[5] E.g., the EB took two decisions on the treatment of existing policies in baseline-setting, at its 16th meeting in October 2004 and at its 22nd meeting in November 2005.

offset emissions in developed countries, the CDM has to make an additional contribution.

Consequently, the CDM has to stimulate a change in the pattern of development in carbon intensive sectors. Future projections of emission growth in major developing countries (IEA 2004) suggest that sectoral transformation towards climate friendly modes of development in key sectors is imperative to maintain climate stability.

But instead of triggering changes in key sectors, the CDM focuses on isolated projects only (Figueres 2005: 1). This is due to its design as a project-based and private sector driven mechanism: investors choose projects according to their financial benefits, not because of their environmental benefits. In addition, the CDM is perceived to fail to transfer environmentally sound technology on a large scale (Yin and Pearson 2002: 5).

Consequently, it has even been argued that the CDM is fundamentally incapable of achieving essential structural changes (Sterk and Wittneben 2006: 2).

Figueres (2006: 1) also comes to the conclusion that the CDM falls short of being an effort to decarbonise national economies. Nor will it contribute to much needed sectoral transformation within national economies (ibid.).

This can be illustrated by the transport sector: although this sector accounts for about 25% of global CO_2 emissions, only one project is presently in the pipeline (Sterk and Wittneben 2006: 9, Fennhan 2006). None has been approved by the CDM Executive Board so far.

Three sectors in particular are seen as performing at less than their full capacity to date: industrial energy efficiency and power sector projects; the renewable energy sector; and small scale community projects (Coseby et al 2005: 23). At COP/MOP1 concerns were expressed that these types of projects are generally not competitive within the current CDM framework (Sterk and Wittneben 2006: 11).

CDM's contribution to sectoral change is further neglected by a perverse incentive caused by the current design: in order to ensure additionality, developing countries will not adapt environmentally friendly policies, as this would negatively affect their baseline (ibid: 10).

Although the Executive Board successfully adopted some measures to overcome this problem,[6] the CDM still does not set any positive incentive for developing countries to adopt environmental friendly policies. This has to be regarded as a major shortcoming, as such policies would be crucial to trigger sectoral change.

2.2.2 Sustainable development

A number of researchers have voiced concern that the CDM does not fulfil one of its objectives: it is perceived to fail to contribute to sustainable development in host countries. In October 2005, at a conference on "Climate or Development" held at the Hamburg Institute (HWWI), all speakers agreed that development benefits of CDM projects have been relatively limited so far (Michaelowa 2005).

However, assessing sustainable development impacts of the mechanism is difficult; there is no agreed definition, nor any agreed criterion by which to judge projects' contribution to sustainable development. In the most important work in this regard, Sutter (2003: 45) tries to provide some clarification: he suggests that sustainable development should be seen as a guiding principle, which needs a concrete context to become meaningful. Accordingly, the sustainability of projects has to be assessed in connection with the specific environment and against a reference scenario. In addition, Sutter claims that the "macro-level" has to be taken into account (ibid).

This is supported by the formulation of Article 12 of the Kyoto Protocol: the notion of the "ultimate objective" (as discussed above) can also be interpreted as a clarification of sustainable development. This would be in line with Sutter's arguing that the macro level has to be taken into account.

Theoretically, all CDM projects have been defined to actually contribute to sustainable development by host country approval. In fact, however, host countries are perceived to be mainly interested in getting access to a new source of foreign direct investments (Coseby et al 2005: 38). The desire to attract projects and investments overrides host countries' efforts to assess projects' contribution to sustainable development thoroughly. There is a clear trade-off between cost-efficient

[6] At its 22nd meeting, the EB adopted the "Clarifications on the consideration of national and/or sectoral policies and circumstance in baseline scenarios". According to this ruling, "*policies or regulations (…) that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997) shall be taken into account when developing a baseline scenario*." In addition, "*policies or regulations (…) that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario*."

emission reductions and the contribution towards sustainable development (Suttner 2003: 72).

Michaleowa (2005: 2) even claims that many host-countries are unconcerned with the additionality of CDM projects. This can be regarded as a major problem, since non-additional projects do not provide development benefits, seeing as the expected results would also happen under business-as-usual circumstances.

In addition, investors are perceived to focus solely on obtaining a large number of low-cost CERs (Coseby et al 2005: 38). This is illustrated by the current dominance of so-called HFC-23-projects in the CDM.[7] This type of project contributes a very high amount of CERs at low costs, but represents an end-of-pipe technological fix with no sustainable development benefits at all (Figueres 2005: 7).

Instead of contributing to sustainable development, HFC-23-projects might even negatively affect the protection of the ozone layer, thereby compromising sustainable development (Schneider et al. 2005: 46). From this it becomes clear that a project's local impact on sustainable development cannot be measured in terms of the number of CERs it generates (Sterk and Wittneben 2006: 8).

Furthermore, types of projects with an allegedly high contribution to sustainable development, namely energy efficiency, renewable energy and transport projects, are marginalised (ibid: 2).

Until the sustainability performance of the CDM is improved, the risk of a backlash against the mechanism and its potential remains real.

2.2.3 Regional imbalance

The regionally imbalanced distribution of the CDM is another cause for criticism. African countries in particular are left empty-handed with very few CDM projects. In total, there are just 11 projects in the pipeline for Sub-Saharan Africa, but 321 for Asia and 163 for Latin-America (Fennhan 2006).

Least developed countries do not seem to benefit from the CDM in a meaningful way. As a consequence, the CDM's contribution to sustainable development has to be questioned one more time, as least developed countries are in dire need to receive

[7] According to the Pipeline provided by the UNEP Risø Centre, HFC-23 decomposition-projects generate 42% of the global annually expected CERs (Fenhann 2006). The problems connected with this type of project are discussed in more detail in a Chinese context in Section 4.4.3.

foreign support to enhance economic development. On the other hand, it should be noted that the regional imbalance might simply be a consequence of the CDM following its other objective: to mitigate carbon emissions. The potentials for the mechanism are much greater in emerging economies in Latin America and Asia.

However, the concerns raised by the failure of the mechanism to contribute to sustainable development in least developed countries were also raised by participants of COP/MOP1 in December 2005 (Wittneben et al. 2005: 12). Consequently, the COP/MOP asked the Executive Board to prepare recommendations for COP/MOP2 to address this issue (FCCC/KP/CMP/2005/L.7).

2.2.4 High transaction costs

In addition to the claims that the CDM fails to meet its principle objectives set out by the Kyoto-Protocol, the complex nature of CDM implementation has given cause to criticism.

A key concern, voiced by many stakeholders and researchers, is that transaction costs are too high (Coseby et al. 2005: 54). In general, high transaction costs are the result of the lengthy and complex process leading to project approval (Pan 2002: 3).

Typically, most of the transaction costs occur at the front end of the project. That is, before any CERs or revenues have been received (Sterk and Wittneben 2006: 5). Verification and certification alone can easily amount to more than 20.000 Euros per project (Michaelowa and Jotzo 2005: 514). The total costs to set up a PDD are estimated to be about 100.000 Euros (Interview Gao Aihe: 3).

In particular, the rules to prove additionality of projects have given rise to many complains by the business community. Their proponents claim that the additionality tool provided by the Executive Board is unnecessarily complicated and does not reflect business considerations (IETA 2004: 12).

High transaction costs are accompanied by a considerable risk, uncertainty and delay in process of approval and project implementation (Coseby et al. 2005: 44).

2.2.5 Uncertainty about post 2012

The uncertain future of the climate regime is another major problem for CDM development. So far, barring an agreement on a future climate regime, investors can

only base their calculation on CERs generated in the first commitment period to offset project development costs.

Without a prompt agreement on the second commitment period, investments in CDM projects and their development will phase out because project developers will usually want to benefit from the full length of the commitment period. The lengthy process of project development and implementation can only reinforce this probable trend.

2.2.6 Summarising the critique

The critique on the CDM differs in its scope. According to one line of argument, the CDM fails to contribute to its principle objectives. The other line of argument criticises the CDM for its complex nature and calls for simplifications of the application procedure. Finally, the uncertain future of the Kyoto regime and the global carbon market is considered a major problem.

2.3 Introduction of a policy-based Clean Development Mechanism

As I have shown in the section above, there is an intensive debate on the shortcomings of the CDM. Naturally, this debate has caused another discussion on possible ways to overcome the shortcomings. Within this debate, sectoral approaches have rapidly gained prominence. Sectoral approaches are sometimes perceived to be a “silver bullet” for all existing problems of the CDM.

In this section, I will first present different definitions of sectoral approaches as discussed in the literature. Secondly, I will introduce a rational for sectoral approaches based on the critique presented above. Finally, I will aggregate this discussion and suggest a “policy-based CDM”. This will be the model I am going to evaluate further in the course of this thesis.

2.3.1 Defining a sectoral approach

Discussions on sectoral approaches to the CDM have just entered the arena of official climate negotiations. In its decision on “Further Guidance Relating to the CDM” taken last year, the COP/MOP1 ruled on policies, programmes and large-scales bundles in the CDM. The relevant provisions read:

- “*local/regional/national policy or standard cannot be considered as a clean development mechanism project activity*” (paragraph 20)

- "*project activities under a programme of activities can be registered as a single clean development mechanism project activity provided that approved baseline and monitoring methodologies are used*" (paragraph 20)
- "*large-scale project activities under the clean development mechanism can be bundled*" (paragraph 21)

These provisions exclude policies and standards, but include programmes and bundles in the current regime. While the meaning of "bundling" is clear (the combination of several projects), there has been no clarification on the distinction of "policies" from "standards" and "programmes".

In the discussions leading to this decision, Annex I countries raised concerns that sectoral approaches might water down the CDM. In contrast, non-Annex I countries perceived the sectoral CDM as a way to improve and broaden the scale of the mechanism (Wittneben et al. 2005: 13).

Although the COP/MOP1 has ruled out policies and standards to be applicable under the current rules of the CDM, observers expect that the issue will reappear on the agenda for a future climate regime (Doelle: 2006: 8).

This point of view is supported by proposals made at the recent twenty-fourth sessions of the Subsidiary Bodies (SB 24) of the UNFCCC (18-26 May 2006) in Bonn. In addition to a number of academic side-events hailing the opportunities of a sectoral CDM, several countries called for a mechanism providing "positive incentives" to enable developing country action for mitigation (SB 24, Submissions of South-Africa and Brazil). Norway "urged" the participants to start discussions on sectoral approaches (SB 24, Submission of Norway).

Even before the COP/MOP1 ruled on the sectoral CDM, a limited number of sectoral projects were submitted to the Executive Board. One project entailed a programme to support energy efficiency in the township of Kuyasa, South-Africa.[8] It was approved on 27 August 2005. Another project entailed an energy-efficiency standard on air-conditioners in Ghana.[9] There is no ruling on the eligibility of this project, as the project proponents withdrew the PDD.

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[8] Project 0079 (approved): Kuyasa low-cost urban housing energy upgrade project, Khayelitsha (Cape Town; South Africa), see http://cdm.unfccc.int/Projects/DB/DNV-CUK1121165382.34/view.html

[9] New Methodology 0072 (withdrawn): Mandatory Energy-Efficiency Standard for Room Air Conditioners in Ghana, see http://cdm.unfccc.int/methodologies/Pamethodologies/publicview.html?-OpenRound=8&OpenNM=NM0072&cases=W#NM0072

Both cases reveal that the distinction between “programmes” and “standards” is not clear. As a consequence it is expected that the EB will adopt a rather strict approach and, when in doubt, will rule against a potential project featuring a policy or a standard.

So far, even in the literature no single and generally accepted model of a sectoral CDM has come up. Different people have promoted different concepts. The discussion is rather complex. In order to provide a clear picture, I am going to introduce various models suggested by a series of authors and their contribution to the debate. On this basis, I am going to discuss the merits of the sectoral approach and finally aggregate a policy-based CDM.

Samaniago and Figueres 2002

Samaniago and Figueres (2002) were among the first to outline a sectoral CDM. They claim that a sectoral CDM would be a “natural evolution” of the current model (ibid: 106). Accordingly, they have modelled their idea on the existing procedures.

The purpose of the sectoral CDM should be to encourage developing countries to adopt climate friendly measures or policies at a regional, sectoral or sub-sectoral level (ibid: 92).

Developing countries would face sectoral emissions targets. These targets should be non-binding; but governments would be able to sell emission credits on the global carbon market if emissions fall below the targets. The revenues should constitute a strong incentive to meet the targets (ibid: 93); governments would redistribute them or their revenues to private entities within the sectors. Basically, the sectoral CDM would follow the current project cycle and would be complementary to the project-based approach (ibid.).

In a second paper Figueres (2005) further elaborates on this model and argues that a sectoral approach would be eligible under current CDM rules. Clearly, these theoretical considerations can now be dismissed against the background of the ruling of the COP/MOP1.

Bodansky et al. 2004

Bodansky et al. (2004: 8) envisage a “programmatic crediting mechanism” as part of a policy-based approach. Rather than on a project level, credits through the CDM

shall be generated by “programmatic” efforts (ibid.). In this context, the terms “programme” and “policy” are convertible and not further specified.

Not unlike what Samaniago and Figueres pointed out, developing countries would be allowed to receive revenues for climate friendly policies, even if these policies were not adopted for climate reasons (ibid.). Efforts could be undertaken on a regional or sectoral basis.

Bosi and Ellis 2005

Bosi and Ellis (2005) look at a number of sectoral crediting mechanisms. They distinguish two general approaches: trans-national sectoral mechanisms covering companies operating worldwide, and national sectoral mechanisms covering domestic sectors. (ibid: 40). Trans-national mechanisms are believed to tackle the problem of competitiveness within fully globalised industries.

Among the national sectoral mechanisms they consider a policy-based crediting mechanism, which would generate benefits by adopting and implementing GHG-friendly policies in a particular sector (ibid: 14). This is basically modelled on the concept of a sectoral CDM by Samaniago and Figueres. But in contrast to their proposal, the model of Bosi and Ellis is seen as an alternative instrument to the CDM (Baron and Ellis 2006: 6).

Bosi and Ellis also consider rate-based or indexed crediting mechanisms (Bosi and Ellis: 23). In the end, they suggest that designs should be combined, e.g. to a policy-based crediting mechanism with a rate-based (or dynamic) baseline (ibid: 40).

Again, the term “policy” is used in a very broad sense, covering governmental policies like taxes, standards and regulations. The policy could cover a whole sector or just part of it (ibid: 14).

Coseby et al. 2005

Coseby et al. (2005: 46-47) differentiate between a “sectoral CDM” and a “policy-based CDM”.

The policy-based CDM is in accordance with the proposal made by Samaniago and Figueres: governments should earn credits by adopting climate friendly policies (ibid: 46). Baselines would be set dynamically.

The sectoral CDM would mainly entail setting a single baseline for a whole sector. Although governments would be involved in baseline-setting, the private sector would remain the project proponents and consequently earn the credits directly (ibid: 50).

Schmidt et al. 2006 (CCAP)

So far, the most elaborate model for a sectoral approach was developed by Schmidt et al. (2006). Although it shares almost all of its features with sectoral approaches to the CDM, this "sectoral pledge approach" is not defined as an evolution of the current CDM. It is rather designed as a completely new mechanism (ibid: 4).

According to Schmidt et al., developing countries would adopt voluntary GHG intensity targets for key industrial sectors (ibid: 2). Emission reductions beyond the "voluntary pledge" would be eligible for sale as reduction credits (ibid.). This model shares the key feature of the above introduced approaches: emission reductions are realised through the adoption of policies in a top-down approach. Thus, it is basically in line with the policy-based approaches introduced above.

A special feature of this model would be a "Technology Finance and Assistance Package". This package should provide assistance to developing countries to pledge to meet more aggressive sectoral intensity targets by supporting the deployment of key technologies (ibid: 9) in these sectors.

2.3.2 Discussing the merits of a sectoral approach

In this section I am going to present a rational for a sectoral CDM. The shortcomings listed in section 2.2 will serve as a basis for this.

Sustainable development

In general, sectoral approaches are perceived to be better able to contribute to sustainable development in non-Annex I countries; a sectoral CDM is expected to be more suitable for certain types of projects which are believed to contribute to sustainable development in host countries, namely energy efficiency, transport and renewable energies (Sterk and Wittneben 2006: 13).

However, one the main difficulty remains: it would be difficult to assess the theoretical impact of a sectoral CDM as long as no commonly agreed criteria for sustainable development exist.

Sterk and Wittneben (2006: 16) also point out that a sectoral approach to the CDM would still reward only the climate benefit, not the local sustainable development.

Sectoral transformation

They key feature of sectoral approaches is its intention to transform entire sectors, thus helping to accelerate the decarbonisation of developing countries (Samaniago and Figueres 2002: 97). By this it is fundamentally opposing the current CDM, which tends to focus on isolated projects rather than sectoral changes.

A sectoral approach would be able to cover the largest share of emissions of non-Annex I countries, if the ten developing countries with the highest GHG emissions participated. This would ensure coverage of 80 to 90% of developing country GHG emissions in each of the selected sectors (Schmidt et al. 2006: 6).

In addition, sectoral approaches are expected to be able to make a significant contribution to needed investment in key sectors – and to redirect the investments in climate friendly technologies (Bosi and Ellis 2005: 9).

Most importantly, a sectoral approach would create a positive incentive for developing countries to adopt climate friendly policies (Sterk and Wittneben 2006: 13).

Regional imbalance

A sectoral approach is not expected to solve the problem of regional imbalance. On the contrary, as a sectoral CDM is intended to focus on key sectors for GHG mitigation, it will probably exacerbate the current imbalance: key sectors for GHG mitigation are typically energy-intensive sectors within transformation-countries such as India, Brazil or China (Sterk and Wittneben 2006: 15-16).

In addition, a sectoral CDM would require a high technical capacity for baseline setting, monitoring and implementation by the host country. This capacity is lacking in most least developed countries (Samaniago and Figueres 2002: 99).

In this context, it should be reminded that a sectoral approach would be complementary. The problem of regional imbalance should rather be solved within the project-to-project approach, which would require a lower technical capability for implementation.

High transaction costs

Due to its nature as a top-down approach, a sectoral approach would relieve projects from complicated procedures such as baseline-calculation or the proof of additionality. This aggregation of projects could reduce transaction costs and maximise domestic opportunities for cost effective reductions (Samaniago and Figueres 2002: 98, Bodansky 2004: 8).

Some investors already explicitly called to move away from bottom-up approaches to determine baselines. Policy-based approaches at the national level are seen as an alternative (Cosbey et al. 2005: 29).

Post 2012 and political feasibility

Of course, the notion of a sectoral approach does not solve the current problem of uncertainty about the future of the climate regime. But on the other hand, it might accelerate the negotiation process, as it offers some advantages from a political point of view.

First of all, a sectoral CDM reinforces the principle of "common but differentiated responsibilities" (UNFCCC, Art 3.1): sectoral crediting mechanisms would create a huge supply of emission certificates, which calls for high reduction commitments of Annex I countries. Thus, a sectoral approach would designate industrialised countries as the driving force in GHG mitigation effort (Samaniago and Figueres 2002: 97).

In addition, a sectoral CDM would be compatible with current Kyoto structures. Principally, it could be integrated into the current CDM structure. This is an advantage because necessary institutions are already in place (ibid: 99).

On the negative side, developing countries might perceive the sectoral CDM to be a major loophole that enables developed countries to buy them out (Samaniago and Figueres 2002: 100). For their part, some developed countries might oppose the idea because they expect developing countries to finance their contribution to GHG mitigation themselves (ibid: 101).

2.3.3 Summarizing the discussion

In summary, the great majority of authors discussing a sectoral approach want to build this sectoral crediting mechanism upon the exiting CDM. It would complement the project-based approach in a future climate regime. The basic functioning is clear:

certificates are granted if emissions fall below a sectoral baseline. Governments would be the main players, stimulating emission reductions through policies.

However, no common definition of “sector” or “policy” is used. For the purpose of this thesis, I will adopt the definition of the term “policy” that is suggested by Bosi and Ellis (2005: 14):

> *“’Policies’ refer to a governmental policy (e.g. tax, standard, regulation) in a specific area. A policy could cover a whole sector, e.g. transport, cement manufacture, or part of a sector, e.g. production of adipic acid.”*

Implicitly, this definition also clarifies the term “sector” by proposing a traditional definition, referring to domestic industrial sectors. As the scope of the policy could be restricted regionally, the sector could be restricted regionally as well, e.g. to the transport sector in any city.

All authors agree that sectoral targets should be non-binding. This means that there would not be a penalty if the targets were exceeded. On the other hand, the prospect to sell emission certificates on the global carbon market would constitute a strong incentive to comply with the target and even fall below the according baseline-scenario.

There is also consensus that targets (and accordingly a baseline) should be rate-based or dynamic in order to reflect the right of developing countries to further economic development. The sectoral targets could thus be energy-intensity or GHG-intensity targets.

As in the current CDM, baseline setting would be a key issue to ensure the environmental integrity of the mechanism. Bosi and Ellis (2005: 19) point out that a baseline simply has to be low enough to ensure that emission abatement beyond business-as-usual is credited. This seems to be the simplest solution. Still, a process has to be found to set a baseline. Schmidt et al. (2006: 8) suggest establishing a baseline by defining energy-intensity benchmarks as a starting point for international negotiations.

Although the concept of a sectoral CDM has become more and more specific in recent years, Sterk and Wittneben (2006: 19-21) point out a number of unresolved questions:

- It is unclear how the costs and benefits would be distributed. Governments need to find a balanced way to redistribute the revenues to offset costs for policies.
- It is difficult to prove the additionality of any policy. In fact, there is disaccord on whether additionality should be proven or not. Some argue that additionality does not have to be considered if the baseline is strong enough.
- Double counting has to be prevented, especially because the sectoral CDM is regarded a supplement rather than an alternative to the current CDM.
- A project approval process has to be found. There are two basic proposals: to follow the current project cycle or to base the system on international negotiations.

It is has to be noted that a sectoral CDM is not necessarily less complex than the current one. Especially baseline setting and the determination of additionality are going to pose further challenges (Sterk and Wittneben 2006: 13). However, it could offer an opportunity to improve the CDM's capability to achieve its original objectives – and to make a significant contribution to stabilising emission concentrations of the atmosphere.

2.4 Conclusion

As we have seen, CDM implementation is moving fast ahead, but there is strong concern that the CDM will fail to meet its objectives.

Foremost, it is feared that the CDM will fail to contribute to sectoral transformation and hence to the decarbonisation of key sectors in major developing countries. Sectoral approaches to the CDM have been designed to overcome this shortcoming.

A number of different models are discussed in the literature. I have aggregated these discussions and presented a policy-based approach to the CDM. In the course of this study, I will only use the term "policy-based CDM", referring to the model I have outlined in this Chapter. However, the term "policy-based CDM" can also be understood as a synonym for the notion of sectoral approaches to the CDM.

Up to now, sectoral approaches to the CDM have been discussed on the basis of a general critique of the CDM. So far, the model has not been discussed in a specific national context. In the course of this study, I am going to confront the policy-based approach to the CDM with the case of China.

3. Methodology

The main part of this thesis is based on semi-structured expert-interviews I have conducted in China. This has a simple reason: there has been almost no research on CDM implementation in China; the few studies available are either outdated or do not provide an in-depth analysis (Oberheitmann 1999, Zhao and Michaelowa 2004).

In total, I conducted 22 expert-interviews from 27 March to 1 June 2006 in Beijing, China. My Interview-partners included all relevant stakeholders in CDM implementation in China, i.e. representatives of the responsible governmental authorities, foreign companies as potential project proponents, consultancies, international donors, non-governmental organisations, and research institutions.

The experts were identified through their direct participation in CDM implementation in China (indicated in official documents such as PDDs) or through discussions with CDM experts in both Germany and China.[10]

The interviews were based on a previously developed question-pool. On the one hand, this methodology enables the interviewer to cover all relevant issues. On the other, it ensures the required flexibility to follow up specific issues if the expert unveils in-depth knowledge. In sum, the interviewer can take an active role, focussing and structuring the interview.

Each section of the interview started with the widest question in order to encourage unbiased answers. E.g. in the section on barriers to CDM implementation, the first question read: "*Are there any barriers for the CDM to meet its objectives?*" Then, more detailed questions followed. The question-pool was spontaneously supplemented during the course of the interview, if appropriate.

The complete question-pool can be found in Annex B.

[10] Experts have been identified through discussions with Dr. Andreas Oberheitmann (RWI), Dr. Axel Michaelowa (HWWI), Bernd Brouns and Wolfgang Sterk (both Wuppertal Institute for Climate, Environment and Energy), Björn Alpermann (Universität zu Köln, Moderne China Studien), Dr. Sven-Uwe Müller, (First Secretary Economic and Industrial Affairs, Deutsche Botschaft Beijing), Klaus Beck (Projektkoordinator Heinrich-Böll-Foundation Beijing), Frank E. Haugwitz (GTZ Beijing), and Professor Pan Jiahua (CASS)

In addition to face-to-face interviews, some respondents answered the questions in writing. In these cases, I refer to “personal communication” rather than “interviews”, since I have not been able to follow-up points of interest with direct interaction.

It has turned out that business representatives in particular were reluctant to take part in face-to-face interviews. Most probably, lack of time is an important reason for this. Business is stuck in a very busy period as time for project-development is running out with the first commitment period approaching fast. This year represents the last chance to develop new projects, but qualified personal is in short supply.

Naturally, not all the persons I have approached for an interview have responded positively: I had originally approached more than 70 experts in China. Some discussions also turned out not to be useful in the context of this thesis, and are therefore not referred to directly here. Nevertheless, the 22 interviews provide all in all an ample basis for this thesis.

The highest number of interviews (8) was conducted with international and bilateral donors. The positive response of this group can be explained by their interest to promote CDM projects in China, and consequently in research on barriers to implementation.

The second largest group consists of academics (6 interviews). In this circle, I have been able to interview all major experts on CDM implementation in China.

The companies interviewed (4) were mainly foreign and domestic consultancies. They are the main (private) actors in CDM implementation. Accordingly, the interviews provided very valuable insights on practical barriers for the mechanism.

Government officials made out the most difficult group to access. In spite of their strong reluctance to take part in an interview, I was eventually able to interview 4 senior officials.

All interviews were transcribed or summarized, the records can be found in Annex C.

There are however some exceptions: energy-related issues are still regarded politically very sensitive. As a consequence, some of my interview-partners asked not to be cited by name. In these cases, I have indicated their function, in order to enable the reader to classify the statement or argument. Nevertheless, all experts agreed to be included in the list of interviewees, which can be found in Annex A.

Foremost, the interviews provide the basis to evaluate CDM implementation in China in Chapter 5. This evaluation will be supplemented with data, when available.

In addition, the interviews will provide an input for the evaluation of the prospects of a policy-based CDM in Chapter 6, which will focus on the ability of such an approach to overcome the existing barriers.

4. The Chinese power sector and the CDM

This chapter pursues a twofold objective: First, I will introduce China's share in global GHG emissions in general and the importance of the power sector in particular; second, I will evaluate CDM implementation in the power sector.

In the course of this Chapter, I am going to verify two hypotheses presented in the introduction:

1. *Because of projected growth, the integration of the Chinese power sector into global GHG mitigation efforts is imperative.*
2. *The current CDM fails to meet its objectives in the Chinese power sector. It neither contributes to sustainable development, nor does it trigger sectoral transformation towards more climate friendly energy production.*

In the following discussion, I will dwell upon a specific notion of international relations and the nation state. I do not want to discuss this in detail, as this would not contribute to answering my research question – but nevertheless want to make this specific theoretical background transparent for the reader, as it influences my conclusions.

My basis will be a neo-liberal theory of international relations, as outlined by Robert O. Keohane and Joseph S. Nye (1977). One of their key assumptions is that states (as well as individuals) are rational actors trying to maximise their benefits. In contrast to neo-realism (as presented by Kenneth Waltz 1979), international co-operation and regime building is not only possible, but plays a crucial role: nation states are able to act collectively to solve global problems such as climate change. Furthermore, the nation state is not a "black box", but consists of a number of institutions that try to influence its position according to their own interests and preferences.

In addition, I will simply refer to the People's Republic of China as "China", as I have done already up until now. Due to the limited scope of this thesis I am not able to give

a general introduction to the political system of the People's Republic, although this would be desirable. Instead, I will introduce specific features of the political system where necessary.

4.1 The Chinese power sector: key for future climate development

In this section I seek to illustrate the key role of the Chinese power sector for global climate development.

When discussing Chinese GHG emissions, it is important to keep in mind that it is extremely difficult to obtain reliable data. Although there have been improvements in statistical reliability, major uncertainties remain (Haugwitz 2002: 15). Different data used in different studies reflect this. Naugthon (2006: 4) even asks: „Are Chinese policymakers victims of their own inaccurate statistics?"

As a consequence, I am mainly going to rely on data used by the International Energy Agency, which is used by most researchers, and complement this with data by Chinese scholars.

4.1.1 Introduction: China's CO_2 emissions

The Kyoto-Protocol classifies China together with developing countries.[11] Consequently it does not face any emission reduction commitments and is even granted the right to increase emissions. Still, in absolute terms, China is already the second largest emitter of GHG after the United States.

In its initial national communication to the UNFCCC in 2004, China revealed that its total GHG emissions amounted to 3.650 million tons of CO_2 equivalent in 1994 (National Communication 2004: 5).[12]

Carbon dioxide emissions have increased rapidly in past years. Driving factors were fast economic growth and rapidly increasing energy demand. In 2002, emissions amounted to 3.307 million tons of CO_2 (IEA 2004: 425). According to this, emissions in China in 2002 exceeded 1994 emissions by more than 26%.

[11] China is not listed in Annex I of the Kyoto-Protocol.

[12] Official Chinese statistics are incomplete. E.g., they do not include mine fires, which constitute an important source of emissions. According to research conducted by the German RAG (which saw a business opportunity in extinguishing the fires), total emissions of mine fires amount to 60 million tons of CO_2 annually (Interview Bodo Goerlich: 2-3).

In the past, China has been hailed for decoupling economic growth and GHG emissions. But research by Naughton (2006: 4) has revealed that this assumption was based on inaccurate statistics. More recent and more accurate data suggests quite the contrary: China has been wasting even more energy and natural resources.

Although Chinese emissions are already quite high in absolute terms, it is important to keep in mind the low per capita level. In 1998, per capita emissions have been 2,5 thousand metric tons of CO_2, whereas the respective German figure was 10,1 (WRI Fact Sheets China / Germany). From an equity perspective, this leaves quite a lot of space for future emissions growth in China.

4.1.2 The share of the power sector

The power sector is the biggest single contributor of GHG emissions in China. Its high carbon intensity is caused by its strong dependency on coal and its low efficiency in power generation. Coal is the fuel that drives the current Chinese development.

Net emissions from energy activities were estimated to be 2.795 million tons of CO_2 equivalent (CO_2e) for the year 1994 (National Communication 2004: 5). This represented more than 76% of China's total emissions at that time, and the ratio is not expected to have changed significantly (Tsinghua University 2005).

The main characteristic of the Chinese power sector is its fast growth. The average annual growth rate has been 4,8% between 1980 and 2004 (Jiang and Hu 2006: 2). Recent years have seen an even higher growth: electricity demand grew by 11% in 2002 and sky-rocketed by more than 15% in 2003, strongly outpacing economic growth (IEA 2004: 263). An immediate consequence of this trend is the major energy shortages that have been felt since the end of 2002. Demand is estimated to exceed capacity by 20 to 30 GW (ibid.). Total installed capacity amounted to 360 GW in 2002 (ibid: 268).

China is the largest coal producing and consuming country in the world. The country possesses 12% of the world's total proven coal reserves. This is contrasted by a relatively limited domestic production of oil and gas. In 2002, coal production was 1.398 million tons (IEA 2004: 267). Jiang (2006: 1) estimates the share of coal in the primary energy use in 2004 to amount to 70,7%, which is even some percentage points higher than in other studies (IGES 2005: 11).

A large number of small thermal power generators also characterizes the Chinese power sector. In 2003, about 5.000 power generators of the 6 MW type or below accounted for an installed capacity of 278.5 GW (ibid: 66). This is more than half of total installed capacity in power generation.

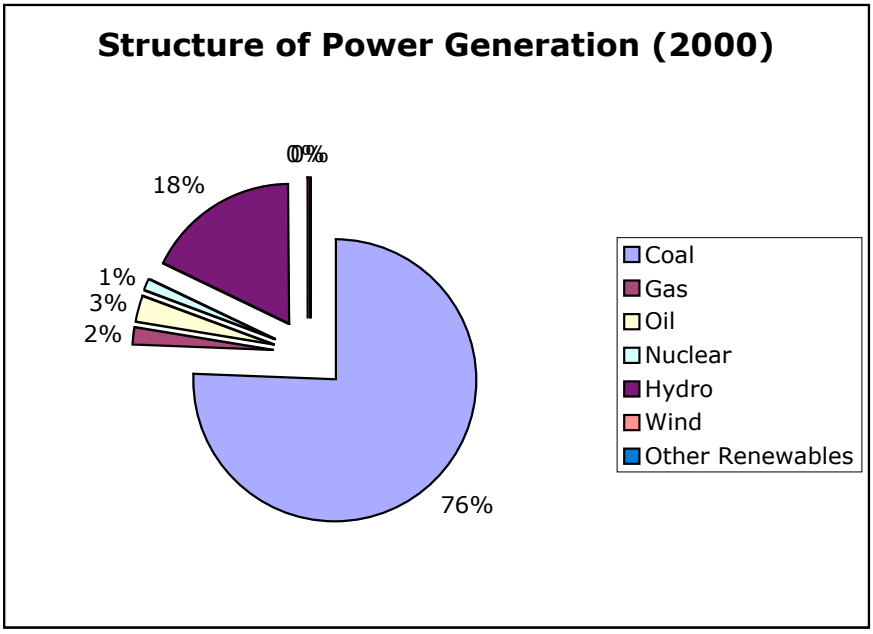
Small generators tend to be relatively inefficient compared to larger units. Because of their large share, this causes a very high inefficiency in the Chinese power sector. However, larger units are also well below state-of-the-art efficiency. On average, the efficiency of coal-fired power stations is 10 to 20 percent below OECD levels (Interview Zou Ji: 1).

The average level of power consumption remains very low. The installed capacity per capita was 0,303 kW in 2003 (IGES 2005: 66). This represents only 58% of the average international level in 2000, or corresponds to the approximate level of major industrialised countries in the 1950s and 1970s (ibid.).

On the other hand, this is contrasted by a very high carbon-intensity in terms of energy use per unit GDP. In 1999, CO_2 emissions per unit GDP amounted to 700 metric tons (CO_2/million $PPP), whereas the German figure was 444 tons CO_2 (WRI Fact Sheets China / Germany).

Few energy sources other than coal play any significant role in primary energy production. Hydropower is an exception, with an estimated share of 18% of power generation in 2000 (Tsinghua University 2005).[13] Other renewables play a negligible role, with an installed capacity of about 2 GW (IEA 2004: 268). The overall structure of power generation is illustrated by graph 1.

[13] This share is expected to rise by several percentage points with the completion of the Three-Gorges-Damn.



graph 1: Tsinghua University 2005

4.1.3 Projections: future developments

There is no doubt among researchers that China's GHG emissions will continue to explode. The scientific debate mainly focuses on the magnitude of this explosion, with ever-greater concern for its environmental implications (Pan 2004: 20).

Although the exact timeframe cannot be predicted, China is widely expected to become the world's largest emitter of GHG emissions within the next 10 or 15 years (Nordqvist 2005a: 7) as a result of strong economic growth, which is linked to increasing energy consumption and GHG emissions respectively.

Jiang and Hu (2006) of the influential governmental Energy Research Institute have presented the latest projection on China's energy demand and emissions. According to their modelling, earlier projections are even going to be exceeded.

Their results show that energy demand in China could rise up to 2,9 billion tons of oil equivalent (toe) in 2030 (Jiang and Hu 2006: 1). Just two years earlier, in 2004, the International Energy Agency had projected the Chinese energy demand to reach only 2,5 billion toe in its business-as-usual scenario in the same year (IEA 2004: 264). In stark contrast, Jiang and Hu even project primary energy demand in their climate friendly "Policy Scenario", which takes an optimistic point of view, to be at least 2,5 billion toe in 2030 (Jiang and Hu 2006: 8).

But even these projections might be too conservative. So far, China has regularly exceeded planned economic growth rates, which are taken as a basis in most projections. Latest developments suggest a continuation of this trend: whereas this year's official GDP growth target is 8%, the economy grew by 10,2% in the first quarter alone (The Economist, April 2006: 31). Consequently, it does not seem unlikely that the official growth target set out in the 11th Five-Year Plan, to double the gross domestic product (GDP) per capita from 2000 in 2010, will be achieved much earlier. This would accelerate emissions growth as well.

Due to its low costs in production, China has become a major centre for manufacturing in the world, relying on energy and resource intensive products (Jiang and Hu 2006: 17). This trend can further increase emissions growth.

Internationally, China will contribute to a growing share of global GHG emissions. Even the relatively conservative numbers of the International Energy Agency suggest a major shift in the share of global emissions towards China, with an increase from 14% to 19% from 2002 to 2030. China's increase in emissions is expected to exceed the increase of all OECD countries combined (IEA 2004: 268). Finally, China's carbon-dioxide emissions should reach 38 billion tonnes in 2030. (ibid: 74). This represents an increase of 15 billion tonnes, or 62% over the 2002 level. But already by 2010, energy-related CO_2-emissions will be 39% higher than in 1990. (ibid.)

In absolute terms, the largest amount of emission growth will come from power generation (ibid: 74). There is no doubt that coal will continue to dominate the fuel mix, in particular in power generation.

These developments would result into the installation of new power generation capacity of 860 GW (ibid: 268). This would outrun the requirements in all other regions examined by the IEA.[14]

In sum, enormously high investments are needed to meet rising energy demand. China will need to invest 2,4 trillion US Dollars in its electricity sector from 2003 to 2030 – 15% of the world total and more than in all the other developing Asian countries put together (ibid: 73). This offers a unique chance to create a low-carbon infrastructure.

[14] To put this into perspective: until 2030, just 30 GW of installed capacity will have to be substituted in Germany (Matthes and Ziesing 2003: 2).

4.1.4 "Allowable" emissions for China

China's heavy emission growth puts additional stress on the global climate. It is adding up to already high (and historically accumulated) emissions of Annex I countries. But how many emissions can China be allowed to add to global GHG emissions without triggering dangerous global climate change?

This question is extremely difficult to answer. Allowable levels of GHG emissions have to be back-calculated from an acceptable level of CO_2e concentrations in the atmosphere. Although Elzen und Meinshausen (2005) came forward with a study on regional implications of such back-calculating, no country-specific data is available yet.

The EU target to prevent global warming to exceed 2°C until 2100 is chosen in this study as the threshold to prevent dangerous climate change – although it is important to keep in mind that this threshold will by no means avert climate changes altogether. The 2°C target is connected with the target to stabilise the atmospheric CO_2 concentration at 450 ppm or even below (Hare and Meinshausen 2004: 37).[15]

In their paper, Elzen and Meinshausen (2005: 23) come to the conclusion that Annex I countries will have to accept much stronger commitments under a climate regime post 2012. By 2020, they will need to reduce their GHG emissions by approximately 15 to 20% compared to 1990 levels (ibid.).

In contrast, most non-Annex I countries will not need to reduce their emissions below 1990 levels. Still, to maintain climate stability, they will have to reduce their emissions compared to the reference scenario by 2020 (ibid: 23). In another survey, Elzen (2005: 68) concludes that non-Annex countries have to start to limit their emissions by 2020.

Thus, Major non-Annex I countries such as China, India and Brazil will have to participate in the reductions within the next two decades (Elzen and Meinshausen 2005: 30).

As a result, global emissions will need to peak around 2015 (ibid.). This is in stark contrast with projected Chinese emission growth, which will be the main contributor to global emission growth and which will continue well beyond 2015. Although no quantitative data is available, it can be concluded that the projected Chinese

[15] It is extremely difficult to determine the allowable CO_2e concentrations in the atmosphere for the 2° C target. For a detailed discussion see Hare and Meinshausen 2005.

emissions trends are not in line with global climate requirements. There is an urgent need for China to mitigate its emissions (Pan 2004: 19); China will have to contribute to global mitigation efforts.

4.2 Alternative options and strategies

4.2.1 Alternative development scenarios

As has been shown, a shift towards a more climate friendly way of development in China is strongly needed to sustain global climate stability. Fortunately, the projections presented do not represent the only possible path of development.

There is unanimity among researchers that Chinese policy-makers can choose between numbers of development paths. In an earlier study, Jiang (1999: 12) pointed out that it could indeed be possible for China to continue high economic growth while maintaining GHG emissions at a low level.

In their latest study, Jiang and Hu (2006) highlight one more time that there is a relatively wide range of possible emission developments. Which path is actually chosen, depends mainly on policy choices.

In the most elaborate work in this regard, the International Energy Agency has considered an “Alternative Policy Scenario” in its World Energy Outlook 2004. This scenario depicts a more efficient and more environmentally friendly energy future than the original “Reference Scenario” (that has been referred to above). The IEA comes to the conclusion that it would be possible to reduce energy demand and carbon dioxide emissions substantially compared to the Reference Scenario (IEA 2004: 367).

Importantly, global coal demand would be nearly a quarter lower in 2030 in the Alternative Scenario. Almost 90% of the reduction would come from power generation (IEA 2004: 79). In contrast to the Reference Scenario, coal use would be driven down by lower electricity demand, increased thermal efficiency and a switch to other fuels (ibid.).

Primary energy demand in China would be 2.205 Mtoe in 2030 – 330 Mtoe or 13% lower than in the Reference Scenario (IEA 2004: 391). China alone would account for one-fifth of global energy savings (ibid).

However, according to more recent studies, the figure for primary energy demand even in a more climate friendly scenario has to be increased to around 2.500 Mtoe (Jiang and Hu 2006: 1).

From a financial point of view, the demand and supply trends in the alternative scenarios would entail a dramatic change in the pattern of energy investments compared with the reference scenarios (IEA WEO 2004: 380).

Although alternative scenarios would imply significantly lower CO_2 emissions, they would not fall nearly enough to ensure that the concentration of carbon in the atmosphere is stabilised. The IEA concludes that additional technologies are necessary to achieve that goal (IEA 2004: 80).

In conclusion, different alternative scenarios unveil that the choice of energy mix and associated technologies and investments will determine whether GHG concentrations can be stabilized (IPCC 2001: 28). Different paths can be chosen, and policies can make a difference.

4.2.2 Priority areas for change

As highlighted above, the large share of coal and low efficiency cause the high carbon intensity of the Chinese power sector. Hence, priority areas for the decarbonisation are higher energy efficiency and the reduction of the share of coal in the primary energy mix. Carbon capture and storage technologies also have to be considered in the long run, since the share of coal is expected to remain relatively high even if fuel conversion is achieved on a large scale. In any case, CCS is still at an early stage of development and not an option in the short-run (Interview Bodo Goerlich: 2).

A reduction of energy demand represents another important option. However, due to the limited scope of this study, I will only be able to focus on the supply side and power generation.

In all priority areas, there is a great need for technological progress and the diffusion of existing technologies (Jiang and Hu 2006: 16). The technologies deployed today are going to determine the emissions of the coming decades. Zou calls this a “lock-in effect” (Interview Zou Ji: 2). This highlights the need to combine immediate action with the development of a long-term strategy.

4.3 The potential of the CDM in the Chinese power sector

In this context, the CDM offers vast opportunities for both GHG mitigation and sustainable development in China. It could promote technological improvements by encouraging energy conservation and the adoption of renewable energy. In addition, it could improve the energy supply mix, secure energy supply, and reduce local pollution as well as GHG emissions (Jin and Liu 2000: 45, IGES 2005: 35).

Furthermore, the CDM is an attractive opportunity in terms of investments. In 2010, foreign investments stipulated by the CDM could amount to 475 million US Dollars annually (Nygard et al. 2005: 7).

In 2004, the World Bank and others concluded a major study that estimates the potential of China's CDM, in particular in the energy sector, and considers the global carbon market and abatement costs (World Bank 2004: xxxv). This study comes to the conclusion that China would be able to contribute as much as half of the world's total CDM potential, with 79,2 $MtCO_2$ for 2010 (ibid: xxxvii). Total market size was estimated to be 164 $MtCO_2$.[16]

Within China, the power sector bears the greatest potential. Although initial estimations by the World Bank have already been revised (from 50% to 37% of China's CDM market, ibid: xxxix, Nygard et al. 2005: 10), the power generation sector will account for the largest share of CERs.

Supplying this account of CERs would require a significant number of newly built larger power stations (300MW-600MW) registered as CDM projects. In addition, the World Bank estimates that up to 100 renewable power projects would need to be put into operation by 2006-07 (World Bank 2004: xxxvii).

Another major research project on China's CDM potential, led by the Japanese Institute for Global Environmental Strategies (IGES), was concluded in 2005. The study estimates the annual GHG reduction potential in China to be about 777 million tons of carbon equivalent or 2.849 million CERs in 2020 (IGES 2005: 75).

According to IGES, main areas for the CDM are energy efficiency, the development of renewable energies, coal-bed methane, power generation, and forestry (ibid: 75). At large, this is in line with the findings made by the World Bank, which identified fuel

[16] Based on three market scenarios, the World Bank estimated China's energy-related CDM market potential in the year 2010 at between 24,9 and 111,6 $MtCO_2$, based on an equilibrium certificate price of 5,20 to 5,60 US-Dollars per ton CO2. The presented number (79,2 $MtCO_2$) is based on disaggregated information from all three scenarios (Word Bank 2004: xxxvii).

switching to combined cycle gas power plants, windpower, landfill methane gas conversion to power and hydropower as priority technologies besides improving energy efficiency (World Bank 2004: 120).

Energy efficiency is estimated to have by far the largest potential, with 545 million tons of carbon-equivalent. Renewable energies are estimated to have a potential of 138 million tons, coal-bed methane 67 million tons, and fuel conversion 28 million tons annually (IGES: 75).

However, this study is generally based on much more optimistic assumptions. It focuses solely on the technical potential of CDM project types, considering policies only to some extent. In contrast to the World Bank study, it does not take the global market and abatement costs into account. As a consequence, the results cannot be considered a realistic estimate of the potential of the CDM. In addition, the study gives figures for 2020 – not for 2010 as would be useful to estimate the potential in the first commitment period. The results are thus for the most part only useful to provide an indication of the highest possible amount of CERs available in China.

In sum, and in spite of the differences in the studies, it is clear that the CDM can provide an opportunity to transfer highly efficient, low-greenhouse gas energy technologies to China and thus stabilise the environmental impact of its economic growth at a relatively low level (Michaelowa et al. 2000: 9).

Main technologies in these areas are:

- *Energy efficiency*: There are various options to increase efficiency in the power sector. The main strategy is to build larger coal-fired power plants (600MW or above) using state-of-the-art technology such as supercritical or even ultra-critical power plants (Interview Zou Dadi: 1). The replacement of small generators would also significantly increase efficiency (ibid.).

  Other options would be to develop new clean coal technologies such as Integrated Gasification Combined Cycle (IGCC) technologies or to promote co-generation projections (IGES: 67).

  A switch to natural gas would improve efficiency as well, but its scope is expected to be limited due to short supply (ibid.).

  There is also space for improvements in the processing of coal.[17]

[17] According to Bodo Goerlich of RAG (Interview: 1-2), about half of the Chinese coal is not washed. This means that 150 to 200 million tons of stone, which cannot be used as fuel, remain in the coal.

- *Small hydro*: There is a great potential for hydropower in the CDM. The total potential capacity of small-scale hydropower that could be developed in China is 125 GW (IGES 2005: 49). According to the National Renewable Energy Development Plan, installed capacity of small-hydropower will reach 75 GW in 2020. This would be 60 million tons of carbon emission reductions annually (ibid: 50).
- *Wind*: The China Meteorology Research Institute estimates that the total exploitable potential of wind power is 1.000 GW (ibid: 47). The Chinese government set the target to reach a capacity of 4 GW in 2010 and 20 GW in 2020 (ibid: 49). This represents 11 million tons of carbon emission reduction annually (ibid.).
- *Solar*: The capacity for solar photovoltaic is estimated to reach 450 MW in 2010 and 1 GW in 2020 (ibid: 52). By 2020, it will reduce emissions by 240.000 tons annually (ibid.)

  The capacity of solar collectors will make a more significant contribution. In 2020, installed capacity may reach 80 GW, reducing 29 million tons of carbon emissions a year.

  The capacity of solar water heating could rise up to 20 GW in 2020. This would represent a reduction of carbon emissions of 20 million tons annually (ibid: 56).[18]
- *Biomass*: Biomass could reach a capacity of 20 GW in 2020, up from 2 GW in 2004. It could reduce emissions by 20 million tons of carbon annually (ibid: 56).

4.4 Implementation of the CDM in the Chinese power sector

In this section, I am going to evaluate the implementation of the CDM in the Chinese power sector and thus, verify the hypothesis that CDM implementation in China has failed.

This huge amount has to be transported, and reduces efficiency in the combustion chamber. In total, it has been estimated that washing coal alone could increase efficiency of coal-fired power plants by about 5%.

[18] Solar water heating is already commercialized in China. A methodology that proves its additionality needs to be developed to make it eligible under CDM rules.

4.4.1 China's approach towards the CDM

Originally, China was very reluctant towards the CDM (Haugwitz 2002: 65). This position has changed in recent years, when China adopted a more positive approach (Heggelund 2004: 5).

During the Kyoto-Negotiations, China perceived the CDM to be a potential loophole, enabling Annex I countries to buy themselves out of their commitments. Even worse, from a Chinese point of view, the CDM had the potential to by-pass the principle of "common but differentiated responsibility". Thus, China opposed the initial idea brought forward by the USA and Brazil.

China maintained a sceptical position on the CDM during the negotiations, which were eventually concluded in the Marrakesh-Accords in 2001. However, the adoption of strict rules for implementation, the focus on sustainable development and the major role given to host countries, made China gradually anticipate the instrument's potential positive impacts for its domestic development. Following China's ratification of the Kyoto Protocol on 30 August 2002, the government's approach eventually changed dramatically: The CDM was hailed as an innovative instrument and a great option for achieving sustainable development and GHG mitigation.

Due to its initially sceptical approach, China started national implementation of the CDM relatively late. The final version of the legal basis, the "Measures for Management and Operation of CDM Projects in China" (hereafter simply referred to as "Measures"), was issued on 12th October 2005.

China now plays a very constructive role within the international CDM framework (Jin and Liu 2000: 11). Chinese officials have even been active in international bodies governing the CDM. Looking ahead, China is already stressing the importance of continuing the CDM under a future climate regime (SB 24, Submission by China).

4.4.2 National implementation of the CDM

As Michaelowa (2003: 18) pointed out, institution building in host-countries is crucial for the CDM. Even if a country has great potentials for the CDM, this does not necessarily mean that many projects will be implemented. An effective national institutional structure is a precondition for meeting the potential.

In its national implementation of the CDM rules, China took a very specific approach. Although it would be a very interesting task, it is out of scope of this study to compare

Chinese implementation with that in other countries such as India. In the following, I will thus focus on the main specifics of the Chinese CDM legislation.

Institutions

The key institution for CDM management in China is the "National CDM Board", which is co-chaired by the National Development and Reform Commission (NDRC) and the Ministry of Science and Technology (MOST), and vice-chaired by the Ministry of Foreign Affairs. NDRC is China's most powerful ministry and responsible for energy politics. The NDRC is the "Designated National Authority" under the Kyoto-Protocol. Thus, it is the national body that gives final approval for CDM projects in China. The other ministries on the National CDM Board are involved in policy-making and project approval.

These provisions are outlined in Section III ("Institutional arrangements for project management and implementation") of the Measures.

The involvement of the State Environment and Protection Agency (SEPA) is limited to a project-by-project level, e.g. when technical expertise is required for certain types of projects.

Late implementation

As already highlighted above, China transposed the CDM into national legislation relatively late. The first, preliminary version of the legal basis was issued as late as June 2004. At this time, India and Brazil were already busy developing projects. Shortly afterwards, they submitted their first proposals to the Executive Board.[19] As already mentioned, the final version of the Measures was issued on 12th October 2005.

Priority areas

China sets out priority areas for CDM projects,namely "energy efficiency improvement", "development and utilization of new and renewable energy", and

[19] Brazil submitted its first project for registration on 3 September 2004 (Project 0008: Brazil NovaGerar Landfill Gas to Energy Project); India submitted its first projected on 8 March 2005 (Project 0001: Project for GHG emission reduction by thermal oxidation of HFC-23 in Gujarat, India), see http://cdm.unfccc.int

"methane recovery and utilization" (Article 4). These areas are broadly in line with China's technological priorities (Oberheitmann 2005: 49).

According to the definition of sustainable development introduced by Sutter in Chapter 2.2.2, these priority areas also provide the context for assessing the contribution of the CDM to sustainable development.

Ownership of CERs and taxation

China regards emission reductions as a "natural resource", having the same legal status as raw materials such as oil or coal. As a consequence, CERs are the property of the Chinese people – who are officially represented by the Chinese government (Lu 2005: 19).

Article 24 of the Measures reads:

> *Whereas the resource of emission reduction belongs to the Chinese Government while the concrete reductions by certain CDM project shall belong to the owners (…).*

There is considerable disaccord among researchers and project-developers about the interpretation of this Article (Interview Rebecca Gunning), but in fact it simply seems to give legitimacy for another Chinese specificity in CDM implementation: CER revenues are taxed according to their project type. HFC projects are taxed 65% of CER profits, N_2O projects 30%, and projects in the priority areas 2%.

These provisions have just been included in the final version of the Measures. The Interim Measures were very vague on this point, simply indicating that CDM revenues shall be shared by a specific ratio still to be decided.

The revenues of this tax are earmarked to contribute to a so-called "CDM Fund". The detailed design of this fund is still unclear, although proposals exist. The co-ordinating Ministry of Finance has already submitted a formal proposal to the State Council (Interview Wen Gang: 4).[20]

Remarkably, the State Council is involved, probably because the Chinese government wants to show that it takes the management of the fund seriously enough to include the highest political authority in the country.

[20] According to Wen Gang of GEF (Interview: 2), who gave some input to the Ministry of Finance, the fund should support four priority areas: capacity building for climate change, mitigation efforts (energy efficiency and renewables), adaptation, and public awareness for climate change. All areas still need to be clarified.

According to GEF, which has been consulted by the Chinese government, the design of the fund will probably be revealed at a public conference (Interview Wen Gang: 3). The volume of the fund is estimated to be about 1 billion US-Dollars until 2012.

Project ownership

In contrast to other countries, the project-owner has to be a "Chinese funded or Chinese-holding enterprise within the territory of China" (Measures, art. 11). In practice, this means that only Chinese companies are eligible for CDM projects. In joint ventures with foreign companies, the Chinese part always has to hold 51% of the project (Lu 2005: 19). There is no possibility at all for foreign enterprises to become the project owner.

National approval

The Chinese rules for obtaining national approval for CDM projects are very strict. This is reflected by article 18 of the Measures. A group of experts has to review each project, before a board (comprised of several ministries and state commissions) takes the final decision and issues the letter of approval. In contrast, national approval is a rather formal but uncomplicated affair in other countries.

Unilateral projects

With article 15 of its measures, China paves the way for projects without a foreign partner or buyer for generated CERs. Whereas China initially opposed the idea of so-called "unilateral" projects altogether (as illustrated by the interim version of the Measures), it is now promoting them through this provision.

According to article 15, it has to be indicated in the PDD that there is no foreign buyer for CERs. The CERs will be transferred to a state account, where they will remain until a buyer is found. Certification by the DNA is necessary to transfer CERs out of the account.

This provision was introduced in the final version of the Measures; it reflects the recent change in the government's position.

Summary legal basis

In sum, it can be said that China's national CDM rules have been crafted very carefully (Szymanski 2006: 4). They strongly favour Chinese interests and ensure that Chinese "resources" are protected. The rules reflect some remaining distrust in the mechanism and in foreign motivations. Through its specific national implementation, China seeks to ensure that Chinese entities will benefit financially from the CDM – and that China maintains close control over foreign involvement (Nygard 2005: 8).

4.4.3 Evaluation of projects

In this subsection, I intend to compare the potential of the CDM, as outlined in subsection 4.3, with the actual projects.

Although the first commitment period of the Kyoto-Protocol is less than two years ahead, there remains some time for project development. Hence, this cannot be a final evaluation. Accordingly, the question will lead to a preliminary assessment: is China *on the right track* to meet its potential?

I will base my evaluation for the most part on the official list of projects, provided by the Office of the National Coordination Committee on Climate Change.[21] This list is constantly updated by the Chinese DNA and represents the most reliable reference besides the official UNFCCC website.[22] In addition, I will also use the project pipeline regularly published by Jørgen Fennhan of the UNEP Risø Centre.[23]

In terms of numbers, China is lagging far behind other major developing countries. In May 2006, China had registered only 7 projects with the UNFCCC; another 7 projects had been submitted for registration (UNFCCC Website). In contrast, India had registed 51 projects and Brazil 43 (ibid.). In total, China's share of the number of CDM projects was only 3.8 percent (see figure 1).

[21] http://cdm.ccchina.gov.cn/

[22] http://cdm.unfccc.int/

[23] http://cd4cdm.org/

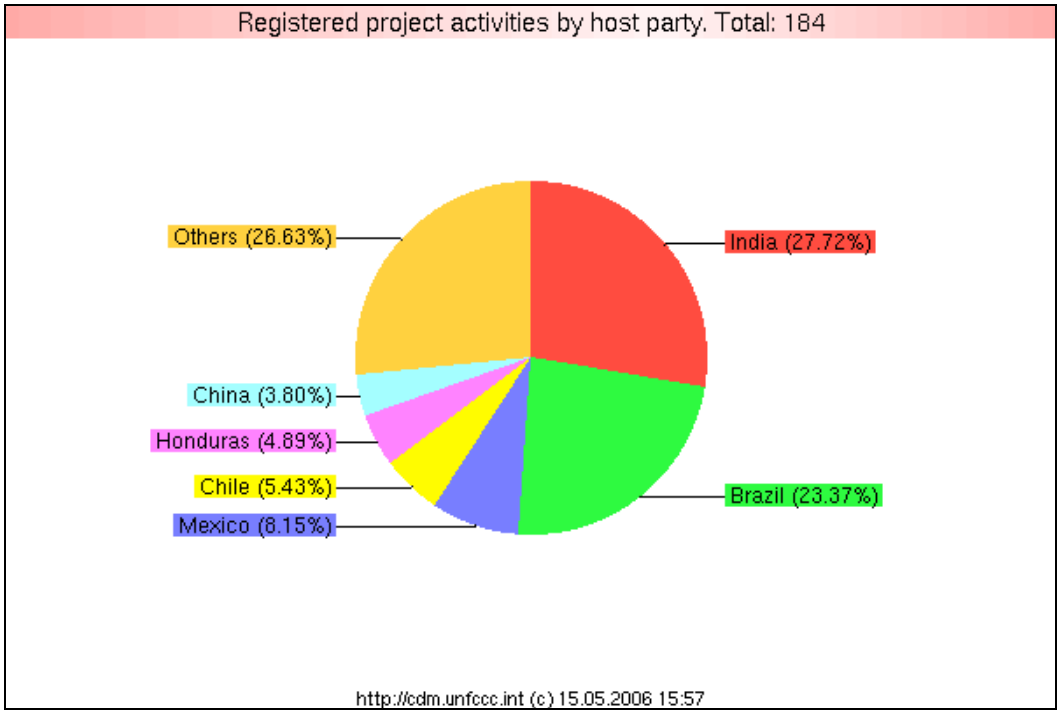


Figure 1

Although the number of projects is extremely low, China is at the top of the list in terms of expected CERs. As of 17 May 2006, China's registered projects were expected to generate 16.6 million CERs annually (UNFCCC website). This represents almost one third of the world's total, which was expected to be 54.2 million CERs annually (see figure 2).

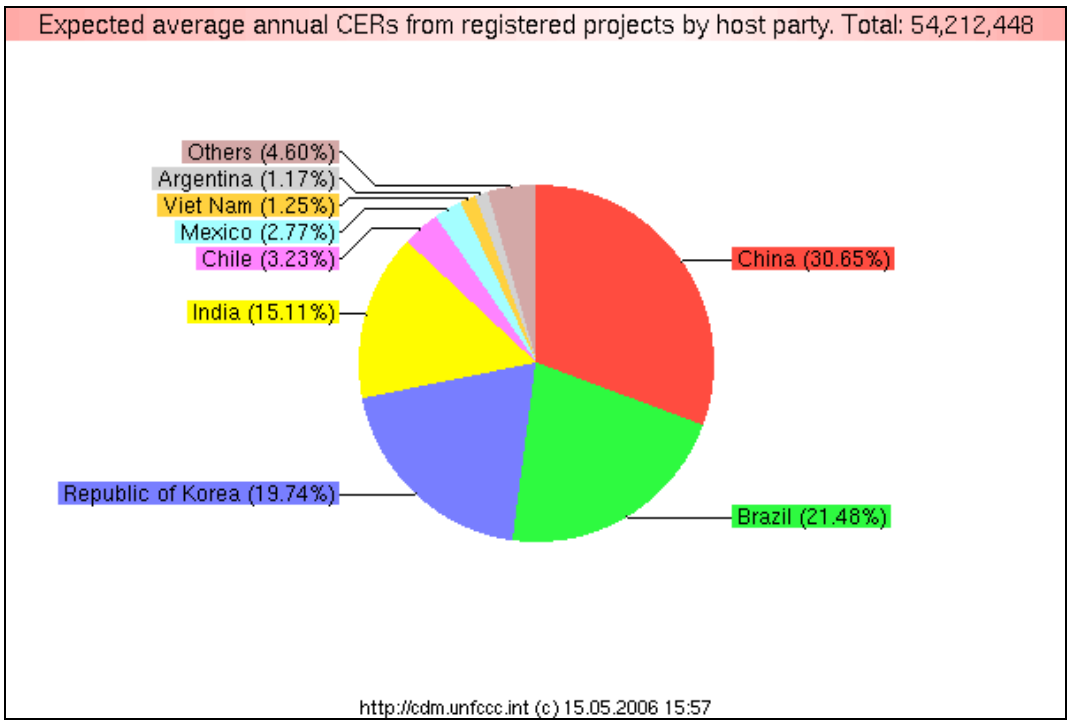


Figure 2

The high amount of CERs is caused by just two projects, which together deliver more than 95% of China's expected annual CERs from registered projects (UNFCCC website). Both projects are on the reduction of HFC-23. Because of this gas' high global warming potential,[24] HFC-23 projects generate an extremely high number of CERs for relatively low costs, making it a very interesting project type for investors.

This project type has raised some concern among researchers (Schneider 2005). Critiques claim that HFC-23 decomposition is a large-scale and end-of-pipe technology that does not contribute to sustainable development of the host country. Some even fear that the eligibility of the HFC-23 decomposition under the CDM has adverse effects on the emission of ozone depleting substances, which are regulated by the Montreal Protocol on Substances that Deplete the Ozone Layer, as it might increase the production of HCFC-22, which is an ozone-depleting substance itself (Schneider et al. 2005).

The Chinese side, on the other hand, defends this project type. Proponents point out that China is simply following international rules, which explicitly allow HFC-23 projects (Interview Lu Guoqiang: 1).

But in sum it is clear that the dominance of HFC-23-project distorts the Chinese CDM-market. Besides not having significant consequences for sustainable development, the high amount of generated CERs redirects attention from the priority areas (renewable energies, energy efficiency). In addition, the high supply of CERs will have effects on prices, which are expected to fall. In turn, this makes it even more difficult for energy efficiency projects, as their transaction costs are relatively high.

The five remaining projects already registered by the UNFCCC include landfill methane recovery, wind-, and hydropower.

However, these first 7 projects registered by the UNFCCC do not constitute a comprehensive basis for evaluating the CDM in China. The low number of projects can be regarded as a consequence of China's initially reluctant approach towards the CDM. The existing pipeline has to be taken into account to get a more comprehensive picture of CDM implementation.

[24] HFC-23 is a by-product of HCFC-22 production, a refrigerant. HCFC-22 is mainly used in air-conditionings; its use is regulated under the Montreal Protocol on Substances that Deplete the Ozone Layer. The Second Assessment Report of the IPCC identifies for HFC-23 an enormously high Global Warming Potential (GWP) of 11.700. This means that 1 ton of HFC-23 is equivalent to 11.700 tons of CO_2 in terms of climate effects (over 100 years).

For China, UNEP's Risø Centre lists a total of 47 projects at "validation stage" in its pipeline, excluding those already submitted to the UNFCCC (Fennhan 2006). The numbers for India and Brazil are 211 and 88 respectively (ibid.). This suggests that China's share in the total number of projects will remain relatively low. But it is important to note that the CDM Executive Board might reject some of the projects, or that new projects might appear, so that the ratio could change.

The Chinese DNA itself lists 46 projects[25] that have been approved nationally, in addition to 7 projects that have obtained a "letter of no objection" (DNA website). Again, it has to be noted that the CDM Executive Board might reject some of the projects.

Although the number of renewable energy projects is going to increase, the dominance of HFC-23 projects remains: 7 HFC-23 projects are expected to contribute to more than 90% of the total annual CERs generated by China. On the other hand, the 32 hydro- and windpower projects will contribute to only about 6% of total CERs. Landfill methane recovery, energy efficiency and afforestation will contribute even less (see table 1).

Approval Status of CDM projects in China (up to May 12, 2006)

Type	number	CERs (tCO2e/y)	share of no	share of CERs
Wind	20	1.991.229	43,48	3,93
Hydro	12	1.260.283	26,09	2,49
Landfill	4	1.132.218	8,70	2,23
HFC	7	46.105.729	15,22	90,95
Afforestation	1	20.000	2,17	0,04
Energy saving	2	186.116	4,35	0,37
Total	**46**	**50.695.575**		

(table 1, http://cdm.ccchina.gov.cn)

Considering all the projects in the pipeline, China's share in global accumulated CERs at the end of the first commitment period will remain as high as 33% (Fennhan 2006).

Although the current pipeline offers important insights on future CDM development, it does not show the full picture. In addition to the uncertainties already mentioned, my interviews revealed that a much greater number of projects are currently under

[25] Including those already submitted to the UNFCCC for approval.

consideration in China. Some donors estimate the number of projects to be significantly above 100 (Interview Ferrara and Leggio: 2).

Further uncertainty is caused by the development of HFC-23 projects. In total, there are about a dozen possible processing plants of HCFC-22 in China which qualify for HFC-23 decomposition (Interview Lu Guoqiang: 2). Up to 12 May 2006, just 7 HFC projects had been listed in the official list of the DNA.[26] But most probably not all of the sites will be eligible for the CDM. Apparently the state of some of the plants is so bad that they would not pass "due diligence" by the CDM Executive Board (Interview Ferrara and Leggio: 2). In addition, the ownership-structure of some plants prevents their participation in the CDM (Interview Lu Guoqiang: 1).

There are also plans to set up large-scale coal bed-methane projects (Interview Bodo Goerlich: 2), but their exact size and number remains unknown so far.

As a consequence, the share of HFC-23 is likely to fall. But even considering all the uncertainties, it will continue to dominate the CDM in China. None of the other options has a realistic potential to create as much CERs as the already approved HFC-23-projects. One of the main reasons for this is the lack of time. Projects in power efficiency could potentially deliver a huge amount of CERs – but there is still no methodology for this project type (efficiency in power plants above 300 MW). In addition, the planning and construction of this project type typically takes a couple of years (Nygard 2005: 7).

Due to the high number of projects in the pipeline, the absolute amount of generated CERs is going to increase. There is a considerable momentum behind implementing CDM project activities in China, not least because the government has become much more active in encouraging project developers (Szymanski 2006: 6).

So is China on the right track to meet its high potential, in the power sector in particular?

In terms of its global share of CERs, China lives up to the expectations. In its update 2005 (Nygard 2005: 10), World Bank expected China to deliver about 37% of global CERs. Currently, the pipeline projects that China will deliver 33% of global CERs by 2012.

[26] Office of the National Coordination Committee on Climate Change, Approval status of CDM projects in China (up to May 12, 2006), accessed at http://cdm.ccchina.gov.cn/ (as of 20.05.2006)

In absolute terms, China is also coming close to the identified potential. World Bank (2004: xxxvii) had projected 79 $MtCO_2$/y; the projects in the pipeline account for 51 $MtCO_2e$/y (Fennhan 2006).

However, this positive evaluation is only due to HFC-23 projects, which have not been included in the projections by World Bank or IGES. Thus, to come to a conclusion based on the presented studies, HFC-23 projects have to be excluded. As a consequence, the final conclusion will be much more moderate.

If CERs generated by HFC-23 projects are substracted, China's global share amounts to less than 6%, and the pipeline only accounts for 6,3 $MtCO_2e$/y. This is an almost negligible share of the outlined potential (less than 8%).

Especially the power sector has not been able to deliver the expected amount of CERs. The World Bank had expected up to 100 renewable energy projects and a number of large power stations; UNEP Risø lists 42 projects in total (Fennhan 2006). Although there are a number of renewable energy projects, there is not a single project on large-scale power generation or efficiency.

In sum, the number of projects in the priority areas of the government (renewables, energy efficiency, methane) is very low. If the CERs generated by these types of projects are considered, their share is even lower. According to Sutter's definition of sustainable development (as presented in Chapter 2.2.2), the CDM does not significantly contribute to sustainable development in China. This conclusion is supported by an assessment of the macro-level: the CDM has not triggered sectoral transformation towards a more climate friendly mode of development in the Chinese power sector.

Even worse, the additionality of some of the renewable energy projects is questioned. Wind- and hydro-power projects in particular are expected to be implemented even without the additional revenues through the CDM (Interview Rebecca Gunning: 2, Interview Jiang Kejun: 3)

In conclusion, China is certainly not on track in CDM development. So far it has clearly failed to fulfil its potential. Even though there are many projects in the pipeline, it will not be able to meet its potential in the first commitment period.

This also has consequences for the decarbonisation of the power sector, to which the CDM has failed to contribute significantly.

4.5 Conclusion

The first sections of this chapter illustrated China's role as a major source of GHG emissions. China already is the second largest emitter of GHG emissions, and is expected to overtake the USA as the number one in 10-15 years.

Projections of China's future emission growth have shown that the business-as-usual development is in stark contradiction with the goal to maintain climate stability.

Thus, the first hypothesis presented in the introduction has been verified:

> *Because of projected growth, the integration of the Chinese power sector into global GHG mitigation efforts is imperative.*

In addition, it has also become clear that China can change the path of development towards a more climate friendly one. There is huge potential for climate friendly and more efficient technologies.

For the evaluation of CDM implementation, it has first to be noted that the current state of CDM implementation represents an incomplete picture. More projects will enter the pipeline and eventually be registered by the Executive Board. Nevertheless, the basic tendencies will not change and some conclusions can be drawn already.

First, it has become clear that the CDM has failed to meet its high potential in the Chinese power sector. The projections of the World Bank and IGES have not been met; the number of projects and generated CERs in the power sector is extremely limited.

Second, in addition to failing its projected potential, the CDM has failed to meet its basic objectives. It has neither contributed to sustainable development nor to sectoral transformation in a meaningful way. This is reflected by the dominance of HFC-23 projects and the overall low number of projects. This severe conclusion is further supported by the lack of projects in the priority areas of the government.

In these areas, the CDM has not contributed to technology transfer either (Interview Jiang Kejun: 4).This situation is enhanced by the acceptance of unilateral projects, which do not require a foreign partner in project development.

In terms of global climate protection, this failure of the CDM to stimulate sectoral transformation represents a major problem, as emissions of the Chinese power sector grow faster than ever.

In sum, the second initial hypothesis has been verified:

The current CDM fails to meet its objectives in the Chinese power sector. It neither contributes to sustainable development, nor does it trigger sectoral transformation towards more climate friendly energy production.

Based on my interviews, I will assess the reasons for this development in the next chapter, before evaluating the prospects of a policy-based approach to overcome the identified obstacles.

5. Barriers and Shortcomings

In this Chapter, I am going to look at the reasons for the Chinese failure to meet its potential in CDM development; I am going to identify barriers to CDM implementation. In doing so, I will try to verify the third hypothesis:

National implementation in China constitutes serious barriers for the CDM.

The expert-interviews I have conducted in China will serve as a basis. Eventually, I hope to be able to raise a number of practical issues as an input for the discussion of the prospects of a policy-based approach to the CDM.

5.1 Barriers to implementation

The barriers to CDM implementation in China are numerous. Since CDM implementation started, project owners, developers and international observers have regularly voiced complaints. As early as 2004, the World Bank (xviii) urged the Chinese government to take a "proactive and sustainable CDM policy" in order to utilize the huge potential of the mechanism and to meet its objectives. This reflects the concern of the sponsors of the study[27] that China's approach to the CDM was too reluctant at the time.

But it seems the Chinese government was not particularly thrilled by these recommendations. According to observers, China has failed to create an acceptable environment for CDM implementation until today (Interview Frank Haugwitz: 1).

[27] In addition to the support by the World Bank, the study was sponsored by the Chinese Ministry of Science of Technology, Deutsche Gesellschaft für Technische Zusammenarbeit, German Federal Ministry of Economic Cooperation and Development and the Swiss State Secretariat for Economic Affairs

5.1.1 Lacking information

Lack of information constitutes the most basic barrier for CDM implementation in China, even though international donors have organised a great number of capacity building projects.

Whereas the central government (namely the NDRC) actively tries to promote CDM projects, local and provincial officials are often not aware of the existence of the mechanism (Interview Markus Schwegler: 2), or lack the capacity to support project owners (Interview Zhang and Zhou: 2).

Recently, this situation has improved. Several provinces have set up regional CDM centres to support and stimulate local activities. Currently, their number is growing (Interview Rebecca Gunning: 2). This seems to be a direct result of capacity building projects.

Provincial officials are not the only ones lacking information. Many companies and potential project proponents do not know the CDM (Interview Lu Guoqiang: 2). The results of an unpublished survey conducted by the CDM Research Centre of Tsinghua University strongly supports this (Interview Deng Haifeng: 3).

Even for companies aware of the CDM, it is still a problem to get started. Specific information on the procedures is missing in many cases (personal communication Xie Libin). This concerns Chinese and foreign companies alike (Interview Claudia Wink: 1).

The language-barrier further aggravates the lack of information. English is not only the language required to write the PDD and to facilitate the approval process, but also to communicate with potential buyers and project partners. Still, English language skills are lacking in most Chinese companies (Interview Markus Schwegler: 1). This also constitutes a difference to India, where English is a working language.

In sum, missing information constitutes a severe problem. Of course, the huge size of the country has to be acknowledged: it is certainly difficult to distribute information to all relevant project proponents. Nevertheless, the government has failed to deliver information to companies, which are supposed to be the driving factor for the CDM.

5.1.2 Missing intermediaries

One of the reasons for the lack of awareness is the absence of an adequate number of consultancies (Interview Liu Deshun: 2). Consultancies are important

intermediaries between potential domestic project owners and international CER buyers. Some consultancies also act as buyers, offering a complete package.[28]

Among the respondents, there was consensus that the number of consultancies is very low considering the size of the Chinese market. On the other hand, the number of consultancies is increasing, which already resulted in some competition. (Interview Rebecca Gunning: 2).

In particular, there is a growing number of Chinese consultancies, albeit their number differs from sector to sector (Interview Gao Aihe: 3). But often, new consultancies lack experience and are considered "weak" in both technical and financial capacity (Interview business representative). For foreign companies willing to develop a project, it is becoming increasingly difficult to assess which of the numerous new consultancies are reliable (Interview Claudia Wink: 1).

At the end of the day, the low number of consultancies does not seem to pose a major obstacle for CDM implementation, although their absence certainly worsens the problem of missing information. As the demand for consultancy is growing, a new market is emerging: The number of companies already started to grow, and the problem of missing experience and expertise will be overcome in due time.

5.1.3 Legal basis

The legal basis for the CDM, the "Measures for Management and Operation of CDM Projects in China" (for an introduction, see section 4.4), have been criticised for many reasons.

Late start

As already pointed out in section 4.4, the legal basis was issued rather late.[29] This has been identified as a major shortcoming for project development and implementation. In the starting phase of the CDM, between the adoption of the Marrakesh Accords and the issuance of the Measures, this situation was particularly evident (Interview Zhang and Zhou: 1). But even the issuance of the "Interim Measures" can be regarded as problematic, due to its character as a preliminary

[28] E.g. Dutch-based "Ecosecurities Ltd." offers to develop the projects and buy the generated CERs

[29] Only one expert challenges this point of view. Lu Guoqiang (Interview: 2) of SEPA for example argues, that China was well in time. He points out that the legal framework was developed in a very efficient way.

regulation. No one could be sure if and how the rules of the game would be changed until the final version of the Measures was adopted.

Although the late start still has to be regarded as one reason for the low number of Chinese CDM projects, it does not constitute a problem today.

Ownership

Out of the potential barriers to CDM implementation in China, the issue of CER and project ownership has by far drawn the greatest attention.

First, the provisions stimulate that only majority-owned Chinese enterprises may serve as project owners. As a consequence, foreign companies are practically deterred to develop projects. They are completely dependend on a Chinese partner and are just allowed to hold a minority of shares of the project activity. This so-called "49/51-rule" practically "scares away" investors (Interview Leggio and Ferrara: 2).

The rules also imply that foreign companies do not control the technology they have transferred to China. This further stimulates the already existing fear that technology might be pirated (Interview Rebecca Gunning: 1, Interview Bodo Goerlich: 1). In addition, companies generally want to be in control of the operation of the project to ensure its long-term profitability (Interview Bodo Goerlich: 1).

Second, foreign companies are not allowed to own the CERs generated by the project activity. Consequently, they have no guarantee that selling the credits will offset their investments.

Thus, foreign investors do not enter the Chinese market as project developers. They just seek to buy CERs from already operating and fully developed projects.

European companies are actively trying to lobby the government to change the ownership rules. They have even set up a "working group CDM" to bundle efforts (Interview Magnus Gislev: 1). However, the government does not appear to be willing to change the provisions in the near or medium future (Szymanski 2006: 5). In fact, the government regards the ownership provisions to be sufficiently fair (Interview Lu Guoqiang: 3). It also does not regard the rules as an obstacle for technology transfer. The HFC-23 projects are considered to be the proof that technology transfer is indeed possible under the existing provisions (ibid.).

Nevertheless, the rules do distort the principle idea of the CDM – being a project-based mechanism, which is driven by private sector engagement and stimulates

international co-operation in climate protection efforts. This is also reflected by the (albeit slowly) growing number of unilateral projects in China. There is a fear that the Chinese government is just interested in publicly owned projects, without direct foreign co-operation (Interview Magnus Gislev: 1).

Taxation

There is disagreement on whether the taxation causes an obstacle to CDM implementation. Whereas the tax is criticised for its pure existence,[30] it is also argued that the specific taxation (according to the type of project) simply seeks to redirect investments to the priority areas and prevents windfall profits for certain project types, e.g. in HFC-23 decomposition (Szymanski 2006: 6, Interview Rebecca Gunning: 2).

The success of HFC-23 projects seems to further indicate that taxation cannot be regarded a main obstacle for CDM implementation. Indeed, although they face a tax of 65% (the highest), this does not prevent project owners to develop CDM projects.

Strict DNA

The role of the Chinese DNA is heavily disputed. On the one hand, it is accused of creating an additional barrier for CDM implementation. On the other hand, it is hailed for ensuring the integrity of the mechanism.

The proponents of the latter argument point out that so far not a single Chinese project has been rejected by the EB – thanks to the thorough project evaluation of the DNA (Interview Liu Deshun: 4). The argument goes that if a project obtained approval by the DNA, it will also be approved by the EB. This should be regarded as enhancing legal security (ibid.).

Another line of argument points out that there is no necessary connection between EB and DNA approval (Interview business representative). In addition, it is not clear whether the DNA uses the same criteria for project approval as the EB does.

The expert perceived the DNA as “strict”, because projects proponents are often asked to revise proposals and regulations are very detailed.

The strict approach of the DNA also causes considerable delays in project evaluation. Although the Measures require the National CDM Board to come to a

[30] Garth Edward, Trading Manager Environmental Products, Shell International Trading and Shipping Company Limited at the “Beijing GHG Forum”, 31 March 2006 in Beijing, China

conclusion within 30 days,[31] the process takes up to twice the time in practice (Interview business representative).

The actual capacity of the NDRC is questioned as well. Within the National Climate Change Coordination Committee, a total of only six persons are directly working on CDM issues (Interview business representative). They have to supervise all related activities of the government.

Critiques are also alerted because the DNA constantly issues new regulations in a highly intransparent manner. As a consequence, project developers regard the legal risks as high; legal stability is regarded a problem (Interview Rebecca Gunning: 1, personal communication Toni Lin: 1). The provision that prices in contracts between buyer and project owner have to be approved by the DNA add up to this (Interview Rebecca Gunning: 1).

In general, project developers perceive the DNA to be "too cautious" (Interview Toni Lin: 2). One project developer describes the role of the DNA in the following way: "*the government authority still behaves like Chinese parents in old days: wanting to have the power to control everything*." [32]

5.1.4 High transaction costs

The whole CDM procedure is perceived to be too lengthy and time-consuming (Interview Liu Deshun: 2). A lot of manpower is needed to set up a PDD – and to facilitate all steps of the project cycle. As a consequence, transaction costs are high.

This is partly due to international rules, but the strict approach of the Chinese DNA and other domestic provisions (e.g. legal insecurity) add up to this.

Costs are particular high for energy efficiency projects in the power sector, as methodologies are missing and the procedures for monitoring are more complex (Interview Rebecca Gunning: 1).

A number of problems are directly connected to high costs:

[31] Measures for Operation and Management of CDM Projects, articles 18.2 and 18.5

[32] The project developer has asked not to be referred to by name.

Upfront financing

Typically, the costs for project development occur at the start of the project. A project developer will not be willing to develop a project if there is no buyer for the generated CERs to offset the costs and to provide upfront financing (Interview Leggio and Ferrara: 2).

This is causing another problem. Although there are a great number of domestic buyers competing for Chinese CERs, few of them offer upfront financing. Many small and medium sized companies lack the funds to start CDM projects, even if they are interested. They cannot afford to take the risks; and the upfront financing is not available. (Interview Liu Deshun: 3).

Domestic Designated Operational Entity

Another factor for high transaction costs is the process of certification and validation through a DOE.

According to Zhang and Zhou (Interview: 3), costs are particularly high in China, since a domestic DOE is missing and fees of international companies are high. Others oppose this view: they argue that competition of an increasing number of DOEs in the Chinese market has had positive effects on prices already (Interview Lu Guaqiang: 2).

In addition, there is no domestic DOE in Brazil or India, and these countries account for the greatest number of approved CDM projects in spite of this. So far, the only non-Annex I country that sports domestic DOEs is South-Korea.[33] Taking this into account, it can be concluded that this point cannot constitute a major barrier to CDM implementation.

This situation is changing anyway: the UNFCCC recently published the application of the "China Environmental United Certification Center", which seeks to be registered as a DOE.[34] As a consequence, a missing DOE has not to be regarded a barrier in the following discussion.

[33] In addition, the South-Africa branch of PricewaterhouseCoopers is registered as a DOE. However, due to its international character, PwC cannot be regarded as being based in a non-Annex I country.

[34] See http://cdm.unfccc.int/DOE/CallForInputs (accessed on 4.07.2006)

Risk averse behaviour

Chinese power companies seem to be particular unwilling to take risks in project development. (Interview Liu Deshun: 3).

This is partly due to their ownership structure: the power companies are publicly owned and any project depends on the approval of the governmental authorities. As a consequence, managers are not willing and/or able to take the decision to participate in the CDM themselves. Instead, they wait for an explicit request by a governmental authority (Interview Liu Deshun: 3).

In addition, according to Liu Deshun of Tsinghua University (interview: 3), companies are afraid to "loose face" at an international level. Chinese power companies have a strong desire to present themselves as modern companies, complying with international standards. They do not want to be caught off the track, failing to get a CDM project approved. In addition to "loosing face", this would also imply to loose a great amount of money (Interview Lu Guoqiang: 3).

In turn, the extremely risk averse behaviour of Chinese companies is observed with great suspicion by buyers and potential project partners, as Rebecca Gunning of ITPower (Interview: 1) points out: "What does it tell about a project, if the project owner himself does not want to put any upfront investment in it?"

5.1.5 Technical barriers

A number of technical issues have been identified as potential barriers as well:

Lacking data

Detailed data on the efficiency of power plants and of the regional power grids is not available. These data are regarded as business secret, if not a matter of national security. This causes problems for all grid-connected projects, in particular renewable energy projects following the approved consolidated methodology no. 2 (ACM002).

This situation is however going to improve soon, as the Executive Board allowed a deviation of the ACM002. For future projects it will be possible to use an average emission factor for the regional power grids (Interview Zhang and Zhou: 2).

Of course, the already approved renewable energy projects had to face this problem. A considerable number of them[35] were obviously able to obtain the required information. Most probably, project owners could establish good relationships with the responsible grid company (Interview Zhang and Zhou: 3).

Missing methodologies

Methodologies are the basis for project development, but in key sectors, as for energy efficiency in large-scale power generation, approved methodologies are not available.

This is particularly significant in a Chinese context (Interview Liu Deshun: 3). Energy efficiency projects tend to be very complex, it is much more difficult to define the boundary, to determine leakage and to ensure the monitoring (Interview Rebecca Gunning: 1). Consequently, the risks connected to both methodology and project development are very high.

In general, Chinese project developers rather use already existing methodologies that have been developed abroad, instead of developing methodologies themselves. This is perceived to be an obstacle for implementation (Interview Zhang and Zhou: 3), as each methodology has its own strict and clear rules and monitoring methods, that have to be interpreted and applied carefully to the special conditions in China (IGES 2005: 80).

So far, only two methodologies (out of 54) have been developed in China: one on coal-bed methane and one on forestry.[36]

Missing domestic methodologies could also be explained with the late start of the CDM in China. There already were a number of methodologies available. Rather than developing new ones, project owners used the existing ones. This could be interpreted as a simple strategy of cost- and risk-minimisation.

5.1.6 Post 2012

Within the Chinese CDM community, the uncertainty about a future climate regime is noted with great concern. There are fears that the whole CDM system, including

[35] Exactly 100 projects in the UNEP Risø pipeline followed the ACM002 as of 12 May 2006 (Feenhan 2006).

[36] The methodology an coal-bed methane has been developed in China, but mainly by foreign experts (Interview Bodo Goerlich).

consultancies and financing agencies, will experience a “crash” (personal communication Xie Libin).

An immediate consequence is that the risks to develop new methodologies (which is a time-consuming process) become even higher. On the other hand, there is a rush to get projects approved as soon as possible – in order to exhaust the first commitment period from the very beginning (i.e. 2008).

5.1.7 Summarising the barriers

The main characteristic of CDM implementation in China is the tight control exercised by the DNA. This is reflected by the ownership rules, the practical exclusion of foreign companies and the strict approach to national project approval.

These policies prove to be particularly counterproductive in a situation where awareness and information on the mechanism are lacking among many domestic companies.

Consequences include a low number of domestically developed methodologies, the low number of projects, extremely cautious behaviour of potential project owners and high transaction costs.

All identified barriers are listed in table 2:

Barrier	**Characterisation**
Lacking awareness	Both companies and (provincial) officials lack CDM specific knowledge
Missing intermediaries	Number of intermediaries is low; difficult to assess which ones are reliable
Legal basis	
Late start	Different versions of the legal basis caused legal uncertainty
Ownership	Foreign companies are practically excluded from project ownership and development
Taxation	Projects are taxed according to their type

Strict DNA	Obtaining approval by the DNA is a lengthy and complicated procedure; the DNA causes legal uncertainty through the intransparent issuance of new regulations
Transaction costs	
Costly procedure	Costs for project development, verification, implementation and monitoring are high
No upfront financing	Cost occur at the front of the project, but there is no suitable financing available
No domestic DOE	The absence of a domestic DOE may cause higher transaction costs
Risk averse behaviour	Domestic companies are not willing to take the high risks
Technical barriers	
Lacking data	Emissions of specific plants are unknown, reliable data is not available in general
Missing methodologies	Methodologies have been developed abroad and have to be applied to the special Chinese situation

(table 2, Interviews conducted in Beijing form 27 March till 1 June 2006)

It can be concluded that all barriers result from the domestic implementation in China.

As discussed above, it has to be questioned if missing intermediaries, taxation, no domestic DOE, and missing methodologies constitute serious barriers. Still, they are listed here because respondents have identified them as potential barriers.

In sum it has become clear that the CDM faces a high number of barriers in China. The domestic implementation gives ample space for improvements for the current CDM. However, this is not the subject of this thesis and would not contribute to answering the research question. But for the purpose of this thesis it can be concluded that the third hypothesis is correct:

National implementation in China constitutes serious barriers for the CDM.

In this context, it should be kept in mind that the CDM represents the very first trail to include developing countries in climate mitigation. Its shortcomings and flaws provide

an important input for the debate on new instruments such as the policy-based CDM (Interview Liu Deshun: 2). Following my basic methodology, I will discuss the consequences for a policy-based approach in the next chapter.

5.2 The government's fundamental attitude towards the CDM

It has become clear, that the CDM faces a number of barriers. These barriers prevent the mechanism from meeting its objectives. In the Chinese CDM community, these barriers are widely acknowledged, as my interviews with the different stakeholders showed.

The existence of obvious barriers suggests that the Chinese government follows another set of objectives than those formulated for the CDM. A policy-based CDM would need to be in accordance with these principles if it was to be more capable to contribute to the original objectives of the mechanism.

There are three main principles that can be identified. They represent an explanation for current CDM implementation and principles to be considered by a policy-based CDM at the same time.

5.2.1 Preserving "low hanging fruits"

One of the reasons behind this specific implementation of the CDM is that China is facing an increasing pressure of the international community to accept a commitment under a future climate regime (Bals 2006: 12).

As a consequence, the Chinese government anticipates a future commitment in a "worst case scenario". Several interviews confirmed this. China does not want to give away the economically most efficient mitigation projects, the so-called "low-hanging fruits" (Interview Frank Haugwitz: 1). This argumentation is in accordance with the concerns raised by China and other developing countries in early international climate negotiations on the CDM (Oberthür and Ott 1999: 222). There are two ways to look at this:

First, it does not make any sense to preserve projects for a second crediting period of the CDM, as the business-as-usual scenario is changing over time. Hence, additionality is changing constantly as well (Interview Liu Deshun: 4). A certain technology might be eligible under the CDM right now – but it might not be eligible under the CDM in the second commitment period any more, because the technology

might be fully localised. This can be expected to occur in the power sector, as China actively promotes energy efficiency anyway. According objectives have e.g. been set out by the 11th Five-Year-Plan (Yifu Lin 2006).[37]

This gives rise to the question why HFC-23-projects – "the lowest hanging fruits of all" (Interview Liu Deshun) – have been promoted so enthusiastically by the Chinese government. One explanation is that the immediate gains are much higher than the potential risks, as the revenues from HFC-23-projects are high.

Second, China might want to use emission reductions in a future commitment period outside the CDM to fulfil a national cap. In this case, it would indeed make sense to preserve certain types of projects. This would also be an explanation for the strict CER ownership rules, as the government may need to use the credits for its own compliance purposes (Szymanski 2006: 5).[38]

5.2.2 Low impact

In total, the CDM is not considered to have a significant impact in terms of additional financing. Financing for the power sector is a major concern of the government, as it tries to keep up with growing demand caused by strong economic growth. In addition, it has to deal with energy shortages, which have been caused by low capacity.

That the CDM is rather perceived as a financial instrument than an environmental one is illustrated by the fact that the NDRC is the responsible authority, and not SEPA (Interview Frank Haugwitz: 1).

The low impact of the CDM can be illustrated by the projected investments in the power sector, which are needed to satisfy electricity demand on the one hand – and the potential benefit of the CDM on the other. According to the World Bank (2004: 73), the Chinese power sector will require investments of about 2.4 trillion US Dollars from 2003 to 2030 in order to meet demands. In stark contrast, the 34 energy related projects approved by the DNA will not be able to deliver a significant contribution. The revenues through CERs (even based on an optimistic price of 8 US Dollars per CER) would just amount to less than 30 million US Dollars annually.

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[37] A more detailed discussion of the 11th FYP follows below.

[38] According to Bodo Goerlich (Interview: 1), the government informally instructed Chinese project owners not to agree on emission purchase agreements with a lifetime beyond 2012. This should also be based on the anticipation of a future (voluntary) commitment.

As a consequence, policy makers consider the contribution of the CDM in terms of investments and technology transfer as marginal – and concentrate on other issues and instruments. Or to put it another way: because the CDM is not expected to provide a significant contribution to project financing, the required time and effort are regarded to be too high. Policy makers simply do not want to spend time to improve the mechanism, because it would not have a significant effect anyway. This is emphasised by the nearly total absence of projects in energy efficiency.

5.2.3 Ownership of the development process

As already noted above, ownership is a key issue for CDM implementation in China. In fact, most of the critique on the domestic rules boils down to the perception that the government wants to remain in absolute control of the projects. At least, it wants to ensure that Chinese project partners exercise the control – and not foreign companies.

This is rendered by the legal basis, and in particular by the ownership rules, the provisions for unilateral projects and the strict approach of the DNA. All these points have been the cause for frequent complaints by foreign companies and international observers (Interview Bodo Goerlich: 1).

The CDM has been designed as a mechanism of mutual co-operation, driven by private sector engagement. Indeed, this basic functioning has always been seen as the great innovation of the CDM: it works bottom-up and guarantees private actors a great flexibility.

But practically, Chinese implementation is ignoring these basic features of the CDM. Instead, the rules systematically prevent private actor engagement from abroad. Even CER prices in emission purchase agreements have to be confirmed by the DNA. The domestic CDM implementation has simply been designed in a way to maximise China's benefits.

But this point must also be considered in a wider development context. Ensuring ownership of any kind of development is a common theme of Chinese politics. In fact, it is a key feature in the national development strategy (Heilmann 2004). There is a constant fear that China might become dependent on foreign suppliers for mitigation equipment, which would hamper domestic sustainable development (Jin and Liu 2000: 36)

This is also reflected by rules for those foreign car-manufacturers who want to enter the Chinese market. They are obliged to become a minority partner in a joint venture with a Chinese partner (The Economist 2005).

5.2.4 Summary: principles governing CDM implementation

Important conclusions can be drawn from the analysis of the barriers resulting from domestic CDM rules; the specific implementation of the CDM reveals fundamental principles of the Chinese government.

The CDM represents the first and only occasion when the Chinese government had to participate in the implementation in the Kyoto Protocol. As such, this implementation offers for the first time an opportunity to observe the intentions of the Chinese government on the basis of governmental action – and beyond the official rhetoric used at UN climate talks.

A newly designed instrument, such as a policy-based CDM, needs to take the discussed principles into account, if it is to be more successful in the Chinese context.

It can be summarized that the government is very cautious and even anticipating the consequences of future commitments. It tries to maximise its own benefit through the CDM, even if it is has to compromise on its original intention. On the other hand, due to its limited impact in terms of finance, the CDM is not regarded as an important instrument.

From this follow a number of additional issues for the evaluation of a policy-based CDM:

- The accordance with a future commitment
- The potential impact in terms of finance
- Ownership of the development process

5.3 China's approach to future climate negotiations

The evaluation of a policy-based CDM cannot be based on the implementation of the current CDM (and its consequences) alone. A comprehensive evaluation also has to include China's more general stance on international climate politics.

From a political point of view, there are two main perspectives to explain China's stance in international climate negotiations: a domestic and an international one. Of course, both are interfering. But the motives for taking up decisions are fundamentally different (Nordqvist 2005: 19).

In this section, I will introduce the general position of the Chinese government in international climate negotiations. Eventually, I will derive a number of priority areas which have to be considered when discussing the prospects of a policy-based CDM.

5.3.1 Domestic perspective

From a domestic perspective, climate politics are part of the energy policy arena. Within this arena, the need to secure the supply of energy is the dominating force.

Albeit, the first glance at recent Chinese politics suggests another conclusion. Indeed, climate protection has been set on top of the rhetorical agenda in recent years. This is illustrated by the adoption of the "11th Five-Year Guidelines on the National Economy and Social Development (2006-2010)" (FYP) on 14 March 2006.[39] At the fourth conference of the 10th National People's Congress, President Hu Jintao personally announced the goal to increase energy-intensity by 20% from 2005 to 2010 (Naughton 2005: 2). National GDP is expected to double from 2000 to 2010.

China was also hailed for adopting a number of climate and energy efficiency policies, most notably the Chinese Renewable Energy Law in 2005 and the China Medium and Long Term Energy Conservation Plan in 2004.

This has lead to the overall perception that China is indeed willing to change its path of development and is already taking important measures (Naughton 2005). Unfortunately, this optimistic point of view has to be contrasted with the actual implementation.

Recently, there have been a number of serious backlashes for climate politics. The renewable energy law is one example: to the horror of international observers, the final version of the law dismissed feed-in-tariffs and introduced a price-bidding

[39] For the first time, the plan has been labelled to be a "guideline" in 2006. Before, it was referred to as "plan". This underscores China's transition from a planned economy to a "socialist market economy" (Zhang 2006: 1). In the following, I will refer to the guidelines as "FYP", as this abbreviation is still used in this context.

mechanism instead. The expected explosion in foreign investment in the renewable energy market stayed away.[40]

The generally bad state of environmental protection is also highlighted by a recently published white book of the State Environmental Protection Agency (SEPA). Zhu Guangyao, deputy chief of the State Environmental Protection Agency, said at the publishing event that China's environmental picture is worsening and "allows for no optimism," (China Daily, 6.06.2006). According to the white book, the cost of environmental damage amounts to roughly 200 billion US Dollars or 10% of GDP annually (White Paper 2006).

There is considerable doubt on whether the energy-intensity goal of the 11th FYP can be met. In the previous 10th Five-Year Plan, a less ambitious target failed to be met already.[41] Even senior governmental officials doubt the achievability of the target. As a consequence, the target in the 11th FYP is rather regarded to be "politically motivated" (Zhang 2006: 10).

Beyond rhetoric, there is unanimity that energy politics in China are driven by the need to establish security of energy supply (Economy 2003: 8). Security of supply is seen as a prerequisite to stabilize economic growth, which is in turn seen as a fundamental right and responsibility of developing countries (Interview Liu Deshun: 1).

In contrast, climate change "ranks last" in the list of priorities (Interview Zou Ji: 2). Even the influential Energy Research Institute confirms this: so far, the government has not taken climate change seriously (Interview Zhou Dadi: 1).

This point of view was also shared by most international observers based in Beijing, although they acknowledged that some measures have been taken. But all these activities, which have been listed above, are rather driven by the need of enhancing security of energy supply, not by climate considerations.

An additional driving force in domestic energy politics is local environmental protection, which causes a more immediate problem to policy makers than climate

[40] For environmental politics in general, the abolishment of a "green GDP calculation" can be seen as a major backlash. Environmental Vice-Minister Pan Yue announced the intention of the government to introduce such an indicator in 2005 (Interview, Die ZEIT 43/2005, "China muss grüner werden", Hamburg, Germany). But the government finally dismissed the idea in May 2006 rather quietly out of "technical problems" (Financial Times, 9.05.2006).

[41] In the 10 th FYP, the target was set to reduce energy consumed by 10.000 yuan of GDP by 15-17% from 2000-2005. But the consumption increased from 1,40 tce 2000 to 1,43 tce 2005 per 10.000 yuan GDP (Zhang 2006: 10).

change.[42] Cleary, the Chinese government is fast in pointing out that it is actually pursuing climate politics through a number of measures. But this is merely a publicity stunt of the government, which wants to be seen as taking climate change seriously (Interview Rebecca Gunning: 2).

In conclusion it has to be clear that energy politics are solely driven by the need to ensure energy security. This partly coincides with climate politics. The government will pursue energy efficiency and renewable energies – because they enhance energy security. At the same time it will continue to display that it is taking up climate politics – in order to demonstrate its role as a responsible member of the global community.

5.3.2 International perspective

From an international perspective, China's position is firmly based on the principle of "common but differentiated responsibilities" as defined by the UNFCCC.

On the one hand, China seeks to defend its *right* for further economic growth. On the other, it seeks to highlight the *obligation* of developed countries to take the lead in emission reductions (Interview Liu Deshun: 1).

China has not yet developed its final position for the future climate regime (Interview Zou Ji). But still it is possible to translate its concerns into a number of priority areas:

- China strongly opposes any kind of national cap. In this context, China points at historic emissions of Annex I countries and at its own low per capita emissions (Interview senior government official).
- Annex I countries are expected to help developing countries in both mitigation and adaptation efforts. Additional financial contributions are expected (Interview Liu Deshun: 1).
- Actions to mitigate GHG emissions can be taken jointly, if Annex I countries are willing to support sustainable development in host countries (Interview Liu Deshun: 1).
- Technology transfer has to be strengthened. From a Chinese perspective, this is key for the success of a future climate regime (Interview senior government official). China also wants to integrate the issues of intellectual property rights

[42] This has been a result of the Dialogue Meeting "China and Europe: Partners in the New Global Energy Econmoy", held in Beijing on 16-17 November 2005.

into the climate negotiations. In May in Bonn, the delegation referred to this issue rather vaguely: “carefully balancing the protection of IPR and the need of technology transfer” (SB 24, Submission by China).

These points have also been brought forward by the Chinese delegation at the first workshop of the “Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention” from 15-16 May 2006 in Bonn. This workshop, which was held as a result of the COP/MOP 1, was the first formal opportunity for parties to express their views on the future climate regime.

China put a special emphasis on technology transfer, and called on the establishment of a new funding mechanism, “to enable developing countries to have access to affordable advanced mitigation and adaptation technologies” (SB 24, Submission by China). China also pointed out that the role of market instruments in technology transfer “should not be overestimated” (ibid.). This is an indication that China is disappointed by the CDM’s contribution to technology transfer. But instead of reconsidering national rules for CDM implementation, the overall design of the instrument is blamed.

China even wants to address IPR rules, which is a highly sensible issue for developing countries and usually not part of UN climate talks (Jung 2005: 16).

By far the greatest concern of policy makers is that China might face a national cap under a future climate regime that could hamper economic growth. Thus, the climate negotiations are rather perceived as a potential risk.

Opportunities are seen in the fields of technology transfer and additional financial inflows.

As a consequence, China is not going to take a proactive approach in the climate negotiations. Neither is it going to sabotage them, although China will take an extremely cautious approach.

5.3.3 Summary: China’s approach

Discussing the domestic and international spheres of climate politics leads to a number of priority areas. From a Chinese point of view, it is imperative that any future climate regime takes into account these priority areas. Hence, a policy-based approach to the CDM will have to consider them as well. Namely, the identified priority areas are:

- Compliance with the principle of common but differentiated responsibilities (Annex I countries taking the lead in GHG mitigation);
- China's domestic priorities in energy politics have to be considered carefully. The security of energy supply is of the greatest importance;
- China is not willing to accept an absolute cap under a future climate regime, but it is concerned about its image as a responsible member of the global community;
- China expects Annex I countries to provide additional financing for both mitigation and adaptation measures;
- The contribution to technology transfer is considered a priority.

5.4 Conclusion

In this chapter, my initial intention was to identify barriers to CDM implementation. Following my basic approach, the barriers shall serve as a basis for the further discussion of a policy-based CDM in a Chinese context.

As already noted above, I have been able to verify my third hypothesis:

> *National implementation in China constitutes serious barriers for the CDM.*

But it has also become clear that more lessons can be drawn from CDM implementation: the barriers offer a first chance to identify general principles of the Chinese government in climate politics. These principles would also be applied to a policy-based approach to the CDM. An assessment of this approach needs to take these principles into account.

Thus, I will need to expand my methodology. I do not only need to assess the prospects of a policy-based CDM on the basis of the existing barriers, but also on the general principles of the Chinese government. This expansion of the methodology can be illustrated by the addition of a new hypothesis. In order to be successful,

> *a sectoral CDM also needs to be in accordance with China's priorities in domestic energy politics as well as with its principles in international climate negotiations.*

This hypothesis will have to be verified in the next chapter, where I am going to discuss the prospects of a policy-based CDM against the background of the three sets of criteria developed in this Chapter.

First, on a very practical level, I have identified barriers to implementation of the current CDM. A policy-based CDM should be able to overcome these barriers, as it is designed as an evolution of the current CDM.

Second, analysing the existing barriers, I have aggregated the government's basic principles behind CDM implementation. These principles reflect the objectives the government pursues with the CDM. If a policy-based CDM aims at better realising the potential of the CDM in China, it will have to be in line with these objectives. Of course it is important to keep in mind that a policy-based CDM would not be designed for China alone – thus the specific concerns and interests of other major developing countries will need to be subject to further research.

Third, to complete the picture, I have introduced China's general stance on climate politics. Both domestic and international concerns have to be taken into account. A policy-based CDM, as part of a future climate regime, has to take these considerations into account as well.

These three groups provide a comprehensive basis for the evaluation of a policy-based CDM in the Chinese power sector.

6. Policy-based CDM as an Alternative

After introducing the concept of a policy-based CDM, I have illustrated the failure of the CDM to deliver its potential in the Chinese power sector (Chapter 4). I have also discussed the reasons for this failure, namely the practical barriers for implementation, the fundamental principles governing the implementation, and finally China's priority areas in climate negotiations (Chapter 5).

In this chapter, I am finally going to evaluate the prospects of a policy-based CDM to overcome the barriers and eventually its ability to achieve the objectives of the mechanism. I am going to verify the fourth hypothesis:

> *A sectoral CDM needs to be able to overcome the existing barriers, in order to achieve the original objectives of the mechanism.*

In this context, it should be kept in mind that the CDM represents the very first trail to include developing countries in climate mitigation. Its shortcomings and flaws provide an important input for the debate on new instruments such as the policy-based CDM.

Baron and Ellis (2006: 13) take this perspective as well: they argue that evaluating the existing barriers should be “at the core” of a new sectoral crediting mechanism.

As discussed in the previous chapter, I will also need to verify an additional hypothesis:

> *A sectoral CDM also needs to be in accordance with China’s priorities in domestic energy politics as well as with its principles in international climate negotiations.*

The terms of reference set up in chapter 5 will serve as a basis for this evaluation.

6.1 Overcoming the existing barriers

A policy-based CDM would be designed as an evolution of the current CDM, based on the failure of the CDM to meet its objectives. Thus, a policy-based CDM should be able to overcome the existing barriers to implementation, and better contribute to sectoral transformation. In this section, I am going to answer the following question: does the policy-based CDM have the ability to overcome the barriers identified in China? The results will be key to answer the research question.

But the question also gives rise to two related topics. First, whether the barriers are applicable to a policy-based approach. Second, whether further issues for consideration arise from this discussion.

Although the interviews were initially only intended to provide the basis for this discussion, some of the experts were able to comment the prospects of a policy-based approach directly. I have included their comments accordingly.

6.1.1 Lacking awareness

Lacking awareness constitutes a major obstacle for a project-by-project approach; but it is not directly applicable to a policy-based CDM. Awareness at a policy level is less important, as the main subjects of the new mechanism would be governments or governmental authorities.

Still, companies would be affected by the policy set by the government. But in contrast to a bottom-up approach, this top-down approach would not require them to drive the mechanism. Instead, governments would have to take the initiative.

Of course, awareness, knowledge and know-how at a project-level are prerequisites for complying with any policy or regulation. But this has to be seen as part of the government's common efforts to enforce its policies.

Consequently, government's general ability to enforce policies has to be considered when discussing the prospects of a policy-based approach. In the case of China, as in many developing countries, this ability is generally perceived to be weak, in particular in the energy sector (Jiang 2006: 16). Principally, a bottom-up approach (such as the current CDM) could offer advantages in such a political environment by providing a direct incentive and bypassing governmental institutions. On the other hand, a policy-based CDM could create a strong incentive to stimulate the enforcement of policies. The additional financial means provided by the mechanism could also enhance the capability of the government in this regard.

Weak enforcement also represents a strong argument to include the implementation of already existing policies in the approach – and not only the adoption of new policies.

From this discussion, some important lessons for the design of the instrument can be learned: one prerequisite for a policy-based CDM would be strong demand for emission reductions, in order to create a financial incentive to enforce policies. Another prerequisite is a strong monitoring and verification scheme, to ensure that policies are actually implemented and reductions achieved. This is essential, as reductions would offset emissions in developed countries. Most probably, an international body would assume this task, as it would have to govern national states. Eventually, it can be concluded that a policy-based CDM should be a supplement to a project-based mechanism, as a bottom-up approach has some advantages as well.[43]

6.1.2 Missing intermediaries

Missing intermediaries constitute a specific barrier for a bottom-up approach. A policy-based CDM will not need to address this problem, as intermediaries such as private consultancies will not be required for its implementation.

[43] Although my research has shown that the current CDM can utilize this potential capability only to a very limited extent in China.

Of course, intermediaries of sorts will be needed for a policy-based CDM as well, as part of the government's general compliance regime. Governmental agencies at provincial and/or local level could play this role.

This leads to an already familiar topic: that of law enforcement.

6.1.3 Legal basis

The "Measures for Management and Operation of CDM Projects in China" are the specific legal basis for the current CDM; the Measures have been tailored for a project-based approach.

Due to its key feature – policies qualifying as project activities – a policy-based approach would not require a specific national implementation such as the Measures. In fact, each policy would require its own legal implementation.

Thus, the barriers caused by the Measures cannot directly be applied to a policy-based approach. Nevertheless, there are a number of important lessons to be drawn for a policy-based approach.

The late start, the issue of ownership, the taxation, and the strict approach of the DNA have been identified as potential barriers to implementation in section 5.2. They all point towards the government's attitude, which has been discussed more deeply in section 5.3. These principles, which underly the Measures, have to be considered carefully. It is also going to influence the Chinese approach towards a policy-based CDM.

Paying tribute to the great importance of this issue, and following the logical structure of chapter 5, I am going to discuss this in detail in section 6.2.

6.1.4 High transaction costs

The high transaction costs of the current CDM are caused by its complex and time-consuming procedures. As the CDM has been designed as a project-by-project approach, each project is facing relatively high costs for its planning, baseline-setting, verification and monitoring.

In contrast, a policy-based CDM would represent a top-down approach. Baseline-setting, monitoring and verification would take place on a sectoral level. This implies lower costs for single projects. Consequently, a policy-based CDM is generally expected to reduce transaction costs significantly and to overcome this barrier

(Interview Zou Ji: 3, Interview Zhou Dadi: 1). For these reasons, there is a preference among stakeholders in China for top-down approaches in the CDM planning and implementation (Jung et al. 2005: 15).

This is concurs with the theoretical discussion (as outlined in chapter 2.2) and should not come as a surprise, as the idea to design a sectoral approach was also developed as a consequence of high costs for individual project activities (Figueres 2006).

In addition, problems related to high transaction costs include unavailable upfront financing and extremely risk averse behaviour by companies (all of them outlined in section 5.1).

The first barrier, extremely risk averse behaviour of companies, can be dismissed. This problem can be regarded as a specific one for a project-based approach. Under a policy-based approach, companies will simply have to comply with a mandatory regulation; they would not need to take a decision on whether to comply with the regulation or not. Although the new mechanism will cause costs on a project-level, a policy-based approach would not pose any risks for companies.

The second barrier, missing upfront financing, cannot be applied directly to a policy-based approach. There is one major difference to the current CDM: a policy-based approach is not intended to create revenues on a project-level. But, as already outlined above, it will cause some costs. Consequently, in order to avoid negative effects on economic development, a domestic mechanism for compensation must be found (Interview Rebecca Gunning: 3).

Compensation has to be designed in accordance with each specific policy adopted. Thus, it is impossible to come to a general conclusion on how to design such a mechanism. However, an example is provided by the proposed (and withdrawn) CDM project "*Mandatory Energy-Efficiency Standard for Room Air Conditioners in Ghana*": The government had proposed to adopt a progressive energy-efficiency standard for air conditioners, and to offset costs for manufactures by direct financial support for research and development.

6.1.5 Technical barriers

Two main technical barriers to CDM implementation have been identified in Chapter 5.1.5: data availability and missing methodologies.

However, to evaluate the prospects of a policy-based CDM, a number of additional issues need to be considered as well. Namely, these are baseline setting, additionality, and monitoring and verification. These issues have already been introduced in the theoretical discussion in Chapter 2. Practical answers need to be found for them as well.

Missing methodologies

As a top-down approach, a policy-based CDM would not require the application of methodologies on a project-level. In fact, it is unclear if a policy-based CDM would need methodologies at all.

But methodologies might offer a chance to provide guidance for baseline setting, the proof of additionality or for monitoring even under a policy-based approach. Then however, and in contrast to the current CDM, methodologies would not be developed on a project-level, but by the international community (Sterk and Wittneben 2006). The result would be a positive list of methodologies which could be applied by governments e.g. to determine their baseline scenario. This could even be a way to dampen the politically sensitive issue of interference with domestic development strategies.

Unlike with the current CDM, the methodologies would be agreed on in a top-down approach *before* the mechanism started working.

In sum, although the barrier of missing methodologies cannot be applied to a policy-based approach directly, its existence gives rise to another issue: the potential of methodologies to solve technical and political barriers in terms of additionality and baseline-setting.

Baseline

Opinions differ whether baseline setting will be more complex or less complex under a policy-based approach.

On the one hand, it may be easier to obtain data for a whole sector such as the Chinese power sector: sectoral data does not reveal sensible data of single power plants. Even today average emission factors (based on the regional power grid) are used to determine the baseline for projects following the ACM002 (see section 5.1.5).

It might also be easier to deal with the issue of leakage,[44] as the project boundary will be a very wide one, e.g. all power plants with a capacity above 20 MW in a given country or province (Schmidt 2006: 9). As a result, it is generally concluded that a sectoral baseline would have great advantages for individual project sites in terms of costs (Interview Liu Deshun: 3).

On the other hand, setting up a baseline might be much more difficult (personal communication Zhou Dadi: 1). This is mainly due to the unclear definition of the term "sector". As the scope of the sector could change significantly in accordance with the policy adopted, a number of difficulties in baseline setting may arise, which are difficult to anticipate. As an example, difficulties in the transport sector could be quite different to difficulties in the power sector. But this applies to a project-based CDM as well.

Another concern is that a sectoral baseline might represent the business-as-usual scenario and thus threaten the environmental integrity of the instrument. One challenge is to accurately foresee technological development. This is particularly difficult in China, because of fast economic growth, data reliability, technological progress and ambitious governmental policies.

At the end of the day, there does not seem to be a big difference between the baseline-setting for a project-based or a policy-based approach. Problems related to determine a baseline basically remain the same. As mentioned in the subsection above, internationally approved methodologies could be used to determine the baseline. This could help to create consistent criteria and to ensure environmental integrity of the mechanism.

Data availability

As for the current CDM, data reliability and availability is key for a policy-based approach. It is especially important for baseline-setting. As the case of ACM002 has shown, sectoral data in China is more easily accessible than site-specific data.

However, this also means a higher risk of getting unreliable data. It will be very difficult to evaluate accuracy, if project-based (plant-based) data is not available. Certainly, a policy based CDM would require China – and other developing countries

[44] Leakage refers to the "Net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity." (Marrakesh Accords, Decision 17/CP.7, Appendix B, Paragraph 4f

as well – to further build up reliable data and the necessary infrastructure (Samaniago and Figueres 2002: 98). This is of special importance in China, where data reliability has to be questioned at all times (Naugthon 2005: 4).

As a consequence, data reliability would indeed constitute a serious problem for a policy-based approach (Interview Zou Ji: 3).

Additionality / Monitoring and verification

Another key issue for ensuring the environmental integrity is the notion of additionality. For the current CDM, this is crucial – as the projects are just going to offset emissions in Annex I countries.

Principally, the situation is the same for a policy-based CDM. But in practice it will be impossible to prove if a policy (or even the implementation of an already existing one) is additional or not (Interview Rebecca Gunning: 3).

To make the mechanism workable, and to avoid a politically highly sensible assessment of the additionality of a domestic policy, baseline setting should generally be very strict. In fact, a baseline that falls well below the business-as-usual scenario would be sufficient to ensure additionality and the environmental integrity of the mechanism. It would also strengthen the environmental effectiveness of the entire regime, as the mechanism would not only offset emissions but reduced further emissions too.

An alternative could be to negotiate a date from which on the adoption of policies will be regarded as additional.[45] But this option has two major disadvantages: first of all, it will be difficult to determine when a policy has been adopted. Options would be the date of approval by parliament, the actual entering into force or even the announcement of a leading political party.

Further, it would not be desirable in terms of climate protection to exclude policies that had not been implemented so far. On the contrary, it would be favourable to find a way to constitute an incentive to implement these policies. Of course, environmental integrity has to be ensured at the same time. As the enforcement of laws is generally weak in China, this argument becomes even more important.

[45] In accordance with the current practice of the CDM. See Chapter 2.2.1.

All this boils down to the conclusion that a very strict approach to baseline setting would be necessary to ensure additionality. This would be an alternative to troublesome evaluation of the additionality of policies.

Of course, baseline-setting itself is a process governed by political considerations. To ensure the environmental integrity of the mechanism, it would be crucial to adopt a baseline that actually falls below the business-as-usual scenario. Thus, baselines will have to be approved by an international body.

This discussion leads to a related topic: monitoring and verification. This will be an extremely difficult task under a policy-based approach, as governmental performance would be evaluated by a foreign entity. (Interview Liu Deshun: 5).

Cleary, governments should not monitor their own implementation. This would provide a great incentive for them to draw too positive conclusions on their own implementation. Once again, an international body should assume this task. It could be an option to change the mission of the EB accordingly.

6.1.6 Post 2012

As the project-based approach, a policy-based CDM has to be part of a future climate regime. Thus, it does not offer a solution for the uncertainty about the future climate regime itself.

At best, a policy-based approach might offer a chance to conclude the negotiations of a future climate regime. This will be further discussed in the following section.

6.2 The fundamental attitude of the Chinese government

The specific Chinese implementation of the CDM allows a first glance at the intentions of the government beyond its rhetoric in the international climate negotiations (see section 5.2). I identified a number of principles, which also have to be considered when discussing a policy-based CDM, namely the issue of ownership, the accordance with a future commitment and potential impacts on investments.

In this section, I am going to discuss the prospects of a policy-based CDM based on these key issues.

6.2.1 Ownership of the development process

Maintaining ownership of the development process has been identified as the driving force behind Chinese implementation of the current CDM. This is indicated by the design of the ownership rules the tight control exercised by the DNA and the general reluctance towards this co-operative mechanism. Implementation of the CDM in China is generally characterised by the desire of the NDRC to keep absolute control over the energy sector.

A policy-based CDM would be able to accommodate this desire: the driving momentum would be shifted from (foreign) companies to a governmental institution. As a top-down approach, a policy-based CDM would enable a strict control of the whole process through the NDRC.

Practically, international co-operation would not be necessary to drive the mechanism once it has been agreed upon. An exception will be the monitoring and verification of emission reductions.

From another perspective however, this would contradict the Chinese priority to stimulate technology transfer. For this, international co-operation is a prerequisite. Technology transfer is highly desirable from a climate point of view as well, as more climate friendly technologies have to be localised in order to reduce future GHG emissions below the business-as-usual scenario.

This conflict is already prevalent in the current implementation of the CDM. The government's desire to exercise absolute control prevents foreign companies to localize new technologies.

6.2.2 Accordance with a future commitment

The current implementation of the CDM indicates that the Chinese government anticipates the possibility of a future commitment. This is illustrated by the ownership rules for the CERs.

A policy-based CDM offers an alternative to a commitment: it would not pose binding obligations on the host country but provide a strong incentive to start climate protection efforts. The government of the host country would be granted full control; international institutions would not pose any limitations on the country. Eventually, the host-country would even have an exit-option: it is not obliged to participate in GHG

mitigation efforts, even if it accepted a policy-based CDM or a sectoral baseline. Thus, a policy-based CDM seems to be in accordance with this Chinese concern.

6.2.3 Financial significance of the mechanism

In order to be taken serious by the Chinese government, a policy-based CDM would need to make a significant contribution in terms of finance. The current CDM has failed to make such a contribution.

There are two ways to measure a financial contribution: the investments created by a policy-based CDM compared with the sum of foreign direct investments; or the investments created by a policy-based CDM compared with the projected future investments in the power sector.

So far, there has been no economic modelling on the scope of a policy-based CDM in terms of its financial implications. This is a major shortcoming of the academic discussion of a policy-based CDM. As a consequence, it is only possible to draw qualitative conclusions.

However, as a policy-based approach is intended to create a strong incentive for emission reductions and would need to facilitate an enormous number of emission reduction credits, it can be assumed that its financial contribution would be a significant one. In principle, a policy-based approach should be a highly interesting option from a Chinese point of view in this regard.

6.3 China's general stance on future climate negotiations

China's position in international climate negotiations is guided by a number of fundamental considerations, as outlined in section 5.3. In order to complete the evaluation of a policy-based CDM, I am going to discuss its prospects against the background of these priority areas.

6.3.1 Common but differentiated responsibilities

For China, maintaining the principle of "common but differentiated responsibilities" is a major concern in international climate negotiations, with a particular stress on "differentiated responsibilities". Translated into concrete requirements, China wants developed countries to take a leading role in GHG mitigation.

There is considerable dissent on whether a policy-based approach is in accordance with this principle.

On the one hand, it can be argued that a policy-based CDM is completely in line with this principle. The responsibilities would be “common”, because both developed and developing countries would be directly involved in GHG mitigation efforts. More importantly, the responsibilities would also be “differentiated”, because developing countries would not face any binding obligations. In contrast, developed countries would have to meet ambitious reduction targets. This is a prerequisite for a policy-based CDM, because a great supply of emission reduction credits would be generated by non-Annex I country participation. The demand site (the obligations of Annex I countries) will have to reflect this (Baron and Ellis 2006: 7).

Surprisingly, this point of view is strongly opposed by Chinese policy-makers (Interview senior government official), and sectoral approaches to the CDM are considered politically very sensible (personal communication Lu Xuedu).

The main argument is that a policy-based CDM with a sectoral baseline would be too close to a binding commitment (Interview Zou Ji: 3). Policy makers fear that a voluntary target could be easily transformed into a mandatory one – which would oppose the principle of “common but differentiated responsibilities” from their point of view. What is more, a policy-based approach would imply a shift of responsibility from private entities (from the current CDM) to the government. Eventually, even if the target (or the baseline) were voluntary ones, the government would be held responsible by the international community if it fails to meet it. Hence, a policy-based CDM might not pose a *legally* binding obligation on China, but a *morally* binding one – and this is not acceptable from a Chinese point of view.

Another argument is that a policy-based CDM would be a gigantic loophole for Annex I countries (Interview Liu Deshun: 4-7). This is referring to a historic discussion, which took place in the early negotiations of the Kyoto-Protocol. At that time, the idea of a sectoral CDM had been dismissed because developing countries perceived it to be a strategy of Annex I countries to bypass their mitigation commitments (ibid.).

There are also doubts on whether a policy-based CDM would indeed have the potential to lower emissions significantly: because per capita emissions of developed countries are much higher, their potential for reductions is much higher as well. By starting a policy-based CDM with such a great scope, necessary emission reductions

in Annex I countries might only be postponed or shifted towards developing countries (Interview Zhou Dadi: 2).

In sum, a policy-based CDM would have theoretical merits when it comes to the principle of "common but differentiated responsibilities". It could even be argued that the mechanism would better be able to comply with the UNFCCC, as it makes a stronger contribution to fulfil the "ultimate objective" of the Convention through sectoral transformation. But in practice, there is strong opposition by Chinese policy-makers and scholars to the mechanism. This might also be perceived as a strategic opposition – because the climate negotiations have just entered a new round.

6.3.2 Domestic energy security

In section 5.3 I have postulated that a policy-based approach to the CDM needs to be in accordance with domestic policy priorities. In the field of energy politics, ensuring the supply of energy is the main concern.

One of the criticisms of the current CDM was related to its weak link to national development (Jung et al. 2005: 84). Creating a stronger link is increasingly gaining in importance as the industrialisation process in China will continue to accelerate – and will have severe implications for energy demand and GHG emissions in China and the world. Consequently, it is imperative that approaches are identified which balance industrialisation and the mitigation of GHG emissions for the next 20 to 50 years (Pan 2004: 18).

In principle, there are coinciding priorities: most efforts for GHG mitigation will also contribute to greater energy security. Energy efficiency in particular (both on the demand and supply side), renewable energies and fuel switch are expected to play an important role in this regard. The renewable energy law and the provisions of the 11th FYP acknowledge this.

A policy-based approach to the CDM could make a significant contribution to meeting domestic policy objectives and to ensuring energy security: the policies adopted under such an approach have to be designed by the government itself – this leaves ample space for the government to ensure the absolute coherence with domestic policy priorities. Thus, due to its great flexibility in terms of the measures it proposes, a policy-based approach represents an additional tool for increased financing to fulfil

domestic development strategies, e.g. through the promotion of energy efficiency improvements.

It has also been argued that the integration of climate policies into domestic development strategies would be the best way for China to participate in GHG mitigation (Interview Liu Deshun: 6). A policy-based CDM would create an additional incentive for this integration of climate policies. This also enhances the potential of this mechanism from a Chinese point of view.

6.3.3 No cap

In the discussion of the principle of "common but differentiated responsibilities" I have already outlined above that from a Chinese perspective a policy-based CDM would be too close to a binding commitment. Currently, Chinese negotiators reject any kind of commitment, including voluntary and non-binding ones.

Nevertheless, at the same time, China is concerned about its reputation as a responsible member of the global community. As a consequence, China wants to show that it is taking action to combat climate change. This is reflected by the rhetoric which accompanies related governmental activities (such as the renewable energy law or the 11th FYP).

However there are also voices that call for stronger actions – and some even propose that China should accept a cap under a future climate regime (Interview Jiang Kejun: 5). They argue that China could easily accept a commitment, since it has already taken serious steps for GHG mitigation domestically (the most prominent example being the energy-intensity goal of the 11th FYP).

This is not a representative position for Chinese policy-makers or think tanks. Quite the contrary: all governmental officials I interviewed strongly rejected the idea of a Chinese commitment. Obviously, this position of the Chinese government constitutes a major obstacle for a policy-based CDM, as officials perceive the policy-based CDM as a subtle kind of obligation.

This perception might very well be strategically motivated: indeed, negotiations for a future climate regime have just begun – and in this very early stages parties do not want to reveal possible compromises or solution. Their main intention is to take a strong position in order to maximise their benefits in the course of the negotiation process.

Although this is highly speculative, China might change its position on policy-based approaches in the future. Statements of Chinese policy makers at the SB 24 meeting in Bonn support this expectation. Negotiators highlighted that China would not accept a sectoral approach under *current* conditions – and that it would need more information to be convinced to accept it (personal communication Lu Xuedu). This implies that China is principally willing to discuss a policy-based approach, if it serves China's interests. In this context, financial implications and the contribution to technology transfer have to be regarded as absolute priorities.

6.3.4 Additional funds

China expects Annex I countries to provide additional funds for both mitigation and adaptation measures. This issue has such a great importance that a strong financial incentive alone could represent the basis for China's acceptance of a policy-based CDM (Interview Sven-Uwe Müller).

A policy-based CDM could indeed make a significant financial contribution. As already mentioned above, specific research on its exact scope is still lacking – I must therefore limit myself to drawing qualitative conclusions.

Of course, the financial contribution of a policy-based CDM would be heavily dependant on demand by Annex I countries on the one hand – and on supply of non-Annex I countries on the other. From a Chinese point of view, high CER prices would be favourable, as this would imply higher financial transfers. But from the perspective of Annex I countries, CER prices need to be at least lower than domestic mitigation costs. These opposing needs have to be balanced.

Due to its wide scope, and its expected significant contribution to GHG mitigation, a policy-based CDM would create a much higher amount of CERs than the current CDM. As a consequence, financial transfers would be much greater.

In this context, it is of key importance that supply and demand is carefully balanced. If supply greatly exceeds demand, prices for emission reduction credits might be too low to provide an incentive to adopt relatively expensive policies to stimulate the enhancement of energy efficiency or renewable energies. Vice versa, if demand exceeds supply, there might be no incentive for Annex I countries to buy emission reduction credits.

The issue of additional financing also represents a principle constraint for the feasibility of a policy-based CDM, as Annex I countries will be reluctant to accept significant financial commitments.

6.3.5 Technology transfer

From a Chinese point of view, the contribution to technology transfer is considered an absolute priority for the future climate regime. Technology transfer is also regarded to be imperative for reducing GHG emissions in China (Jiang Kejun: 5).

A policy-based CDM could play an important role in the localisation of existing GHG friendly technologies: the policies adopted under this approach could create a favourable environment for technology transfer. Examples include a feed-in-tariff for renewable energies or an efficiency standard. At the same time, a policy-based CDM could function as a tool for additional finance for the localisation of technologies. Of course, this depends heavily on the specific design of any policy.

In contrast, a policy-based approach would not be able to make a direct contribution to research and development of new technologies. For this, another instrument would be needed. Nevertheless, the localisation of already existing technology is generally considered a higher priority anyway, because there still is enormous potential for improvements (Interview Magnus Gislev: 2).

On the negative side, this culminates in the fear that a policy-based CDM could hamper technological process, which is needed to control emissions in the long run. Instead of developing new technologies, developed countries would only focus on localising already existing technology (Interview Zhou Dadi: 2).

Hence, although the policy-based CDM is a good approach to support the localisation of existing technologies, a complementary instrument for research and development has to be set up, which will most certainly render the mechanism more complicated.

6.4 Summary

In this summary, I will combine all three perspectives. This is going to form the basis for the conclusion in the next and final Chapter.

First, I have evaluated the fourth hypothesis:

A sectoral CDM needs to be able to overcome the existing barriers in order to achieve the original objectives of the mechanism.

The discussion of the current problems of CDM implementation has shown that many of the present barriers to implementation would not apply to a policy-based approach.

For those that remained relevant, I showed that a policy-based CDM would be able to bypass some of the immediate problems, namely lacking awareness, missing intermediaries and data availability. An essential aspect for this is that governments, and not companies, are meant to be the driving force of the mechanism.

Also on the positive side, transaction costs can be expected to be significantly lower under a policy-based approach. Costs would not occur at a project-level, but on a sectoral level.

The problem of the extremely risk averse behaviour of companies would also be bypassed by the policy-based CDM. And although the issue of lacking upfront financing is not directly applicable to a mandatory regulation under a policy-based approach, it gives rise to a very important topic: project-level costs have to be offset by the government, as it is receiving the revenues.

On the negative side, a number of technical problems remain. They concern the reliability of data (although availability will be easier), baseline-setting, monitoring, and verification. A policy-based CDM will not be able to solve these issues completely, it will rather transfer them to another, sectoral level. In addition, a number of general problems of the political system such as legal uncertainty will remain (Interview Claudia Winkler: 2).

In the course of this discussion, a number of new topics have come up. The question of law-enforcement might be the most important one. In this regard, a policy-based CDM has the potential to create a strong incentive for stricter enforcement – and thus generally improve the domestic law compliance regime.

It has also become apparent that governments will have to find a mechanism to offset single-site costs. Revenues created on a national or sectoral level will have to be redistributed to offset costs at project-level.

Important remaining questions also concern the approval of policies that would come into question for a policy-based CDM. In this context, the application of methodologies, setting out criteria for policy-approval, could offer a solution.

I have not only discussed the policy-based CDM based on the existing barriers, but expanded my methodology and added a new hypothesis:

> *A sectoral CDM also needs to be in accordance with China's priorities in domestic energy politics as well as with its principles in international climate negotiations.*

In this context, I have derived priority areas from CDM implementation and presented the basic principles of Chinese climate politics. The prospects of a policy-based CDM have been discussed on this basis.

Most importantly, a policy-based CDM would be in accordance with the Chinese desire to maintain control over the development process. This can be considered a major advantage of a policy-based approach.

A policy-based CDM also offers an alternative to a binding commitment for China and the other large developing countries, and thus accommodate the Chinese interests in this regard.

It is also likely to make a significant contribution in terms of investments. Unfortunately, this cannot be quantified, as research in this area is lacking.

In sum, a policy-based CDM seems to be better qualified to meet the fundamental attitude of the Chinese government than the current approach.

Eventually, it is extremely difficult to evaluate the prospects of a policy-based CDM against the background of the principles governing international Chinese climate politics.

However, following the official rhetoric, a policy-based CDM does currently not represent an option for the Chinese government. The main reason is its perceived closeness to a factual commitment.

Nevertheless, there are indications that the Chinese government would be willing to consider a policy-based CDM (or other sectoral approaches) at a later stage of the negotiations. In this early phase, parties tend to gamble to clarify their position. By this, they hope to increase benefits in later rounds of negotiations.

In addition, it should not be forgotten that the capacity of the Chinese government in terms of climate change is generally very weak; both knowledge and human capacity are lacking. It could very well be an honest statement if policy-makers announce that they would need more information on a policy-based approach (personal communication Lu Xuedu).

7. Conclusion

In this thesis, I have assessed the prospects of a policy-based CDM in the Chinese power sector. The evaluation of the mechanism was based on the current implementation of the CDM. Accordingly, I had formulated my research question:

> *Can a sectoral CDM overcome the shortcomings of the current CDM in the Chinese power sector; and can a sectoral approach contribute better to the decarbonisation of this sector?*

In the course of the thesis, I had to adjust my methodology to answer the question. A new hypothesis was included in Chapter 5, to broaden the basis for the evaluation of a policy-based approach, integrating basic principles of the government as criteria.

Eventually, the policy-based approach was assessed upon three sets of criteria: (i) its capability to overcome existing barriers, (ii) its accordance with Chinese principles in climate politics, and (iii) its accordance with China's general stance in climate negotiations.

The *first* set of criteria has not lead to a clear conclusion. Clearly, a policy-based is able to overcome some barriers (high costs, lacking awareness, data availability, missing intermediaries) and bypass others (extremely risk averse behaviour). On the other hand, this approach would simply move some technical barriers (baseline-setting, monitoring and verification) to another level, leaving the basic challenges untouched.

At this point it is important to note that a policy-based approach might create new barriers, which cannot be anticipated as long as specific policies and the rules for implementation are not agreed upon.

According to the *second* set of criteria, a policy-based CDM accommodates the basic principles of the Chinese government. In particular, it would guarantee the government the ability to remain in control of the energy sector.

Finally, the *third* set of criteria revealed that Chinese policy makers, due to the mechanism's closeness to a cap, do not currently accept a policy-based CDM.

As a consequence, there cannot be a clear answer for the first part of the research question: a sectoral CDM has the capability to overcome *some* shortcomings of the current CDM in the Chinese power sector – but serious barriers remain.

Accordingly, there can neither be a clear answer to the second part of the research question. On the one hand, there are strong arguments that a sectoral approach can indeed better contribute to the decarbonisation of the Chinese power sector. These arguments include the strong financial incentive, the localisation of technologies, and the coherence with Chinese domestic priorities. On the other, the feasibility of the mechanism has to be questioned because of its perceived similarity to a binding commitment, thus violating the principle of "common but differentiated responsibilities" from a Chinese point of view.

But the political feasibility of the mechanism is of key importance. As I have noted above, it is difficult to assess whether the current rejection of the mechanism is caused by strategic or by fundamental considerations. Thus, it is difficult to realistically assess its feasibility. The evaluation in this thesis suggests that the opposition is a strategic one, because the potential gains outweigh the risks.

During the course of this thesis, an important conclusion has been drawn: when considering a policy-based approach to the CDM, much depends on the specific design of the policy. This will be a key issue for future consideration of this mechanism: what policies would be eligible? What would their scope be? It is only in this context that the question of how to offset single-site costs can be answered.

However, even though there is not a clear answer to the research question, some conclusions can be drawn for the future design of the mechanism. As the debate on the climate regime post 2012 has just begun, the design of the instrument should further be improved.

- A policy-based CDM should be complemented by an instrument to support research and development. While a policy-based approach is able to provide an incentive for the localisation of existing technologies, it offers no direct incentive for the development of new technologies.[46] This has to be compensated.

[46] As discussed in Chapter 6.3.5, a policy-based approach could even have adverse effects on technology transfer.

- The enforcement of already existing policies should be made eligible as a project activity under a policy-based CDM. This would strengthen the environmental effectiveness of the instrument, as many developing countries face serious problems in law enforcement. A policy-based CDM could not only provide an incentive to adopt new policies, but also to actually implement existing ones.
- As a consequence, additionality of policies should not be considered. Instead, sectoral (or even national) baselines should fall well below the business-as-usual scenario to guarantee the environmental integrity of the mechanism. After all, the motivation for adopting a policy is not important – as long as it contributes to GHG reductions.
- A policy-based CDM should only be a complement to the existing project-based CDM. The project-based mechanism has a number of advantages, in particular in a political system with weak law-enforcement.

It is important to note that these conclusions have been drawn from a single example – the Chinese power sector. For the future discussion of the instrument and in order to draw general conclusions, it is important to evaluate these recommendations using a wider basis (i.e. more case studies).

There are also a number of conflicting tendencies, which need to be considered in the future. The *first* one is the Chinese desire to maintain control over the development process. On the one hand, a policy-based CDM is able to fulfil this need very well, as it is a top-down approach. On the other, being part of an international regime, policies would have to be approved by an international body: monitoring and verification of emission reductions would have to be conducted by an independent entity. These are highly sensitive issues, because it implies interference with domestic development strategies. This has to be discussed carefully with negotiators from developing countries.

One possible solution is the application of methodologies, which set out the rules for monitoring, verification and acceptance of a policy. The international community could agree on methodologies without discussing specific domestic policies. Thus, the most sensitive issue could be bypassed. Nevertheless, an independent entity would need to apply the methodologies.

A *second* restraint might be the willingness of Annex I countries to accept strict commitments. As illustrated above, a policy-based CDM would require developed countries to create a huge demand for emission reductions. This might be politically difficult to accomplish.

In this context, demand and supply of emission reductions have to be considered carefully, because this reflects the potential emission reductions in developing countries on the supply-side, and the commitments of developed countries on the demand-side.

Eventually, I would now like to move back to a more general question I formulated in the introduction: is a sectoral approach to the CDM better capable of achieving the objectives of the mechanism?

This thesis has been able to make a practical contribution to the political issues involved, as it discussed the fundamental merits and disadvantages of the mechanism.

But more information is needed, in particular on the potential of a policy-based CDM in terms of emission reductions and prices. This information would be essential to assess whether a policy-based CDM could make a significant contribution to maintaining global climate stability.

Unfortunately, no research on these issues has been conducted so far, so that this question has to remain unanswered for the time being.

Still, on the basis of the evaluation of the prospects of the policy-based CDM in the Chinese power sector, the fundamental tendency is clear: due to its expected enormous scope, a policy-based CDM could very well make a significant contribution to global climate stability, and should complement the current project-based approach in a future climate regime. Hence, it can be expected that sectoral approach will play an important role in the negotiations leading towards the future climate regime.

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Annex A: List of Interviewed Experts

Business

Dr. Bodo GOERLICH, Chief Representative China, RAG (15.05.2006)

Rebecca GUNNING, Chief Representative China, IT Power (12.05.2006)

LIU Shijun, International Project Manager, Chinese Renewable Energy Association, CREIA (1.06.2006)

Toni LIN, CEO Easy Carbon (14.05.2006; email)

Government Officials

LU Guoqiang, Ph.D., CDM Working Unit, Foreign Economic Cooperation Office, China State Environmental Protection Administration, SEPA (24.05.2006)

SUN Guoshun, Director, Department of Treaty and Law, Ministry of Foreign Affairs (29.05.2006)

LU Xuedu, Ministry of Science and Technology (25.05.2006; email)

XIE Libin, ACA Sichuan (29.05.2006; email)

International and Bilateral Donors

GAO Aihe, Senior Project Manager, KfW Office Beijing (11.06.2006)

Magnus GISLEV, First Secretary Environment, European Union, Delegation of the European Commission (20.04.2006)

Frank E. HAUGWITZ, Technical Adviser Renewable Energy Technologies, GTZ (3.04.2006)

Sara LEGGIO and Carlo FERRARA, Project supervisors, Sino-Italian Cooperation Program for Environmental Protection (6.04.2006

Dr. Sven-Uwe MÜLLER, First Secretary, Economic and Industrial Affairs, Embassy of the Federal Republic of Germany (29.05.2006)

Markus SCHWEGLER, Centre for Environmentally Sound Technology Transfer, Ministry of Science and Technology (30.03.2006)

Dr. WEN Gang, Senior Program Officer, GEF China Office (7.05.2006)

Claudia WINK, Investment Manager Special Programmes, DEG – German Investment and Development Company, 19.04.2006)

Academics

DENG Haifeng, Researcher, Tsinghua University, School of Public Policy & Management, Clean Development Research Center (28.03.2006)

Professor JIANG Kejun, Director, Energy System Analysis and Market Analysis Division, Energy Research Institute, National Development and Reform Commission (5.04.2006)

Professor LIU Deshun, Deputy Secretary General China Energy Research Society (CERS), Institute of Nuclear & New Energy Technology (INET), Global Climate Change Institute (GCCI), Tsinghua University (7.04.2006)

Professor ZHANG Xiliang, Dr. ZHOU Sheng, Tsinghua University, Institute of Nuclear & New Energy (INET) Technology, Global Climate Change Institute (GCCI) (27.03.2006)

ZHOU Dadi, Director, Energy Research Institute (17.05.2006)

Professor ZOU Ji, School of Environment and Natural Resources, Dept. of Environmental Economics and Management, Renmin University of China (18.05.2006)

Annex B: Interview Guide

1. Energy politics

1.1 What are the main challenges China faces in the energy sector?

1.2 What are the main policies pursued by the Chinese government in this regard?

1.3 What options for a decarbonisation of the Chinese power sector are the most promising?

1.4 How would you assess the prospects of a sectoral CDM as an instrument to decarbonise the Chinese power sector?

2. Assessing existing and planned CDM projects

2.1 Do the existing / planned CDM projects in China contribute to sustainable development?

2.2 Do the existing / planned CDM projects mitigate GHG emissions (and do they contribute to fulfil the ultimate objective of the convention)?

2.3 Do the existing / planned CDM projects contribute to significantly increase efficiency of the Chinese power sector?

2.4 Do the existing / planned CDM projects contribute to change path-dependency in the power sector towards low-carbon or carbon-free technologies in the long run? (Such as renewables, CCS, natural gas)

2.5 Are there outstanding projects, which can serve as a positive or negative example?

3. Application process

3.1 What are the sustainable development requirements for CDM projects?

4. Identification of barriers

4.1 Are there any barriers for the CDM to meet its objectives?

4.2 Are there barriers within the design of the instrument itself (in provisions set out by the Kyoto-Protocol or the Marrakesh-Accords)?

4.3 Are there barriers within the following fields:

- Legal basis (national application process)
- Expertise / Knowledge
- Finance
- Project development costs (transaction costs)
- Others

5. Prospects of a sectoral approach

5.1 How could a sectoral CDM in China look like (policy, programmatic or sectoral)?

5.2 Could a sectoral CDM help to overcome the existing barriers to implementation?

5.3 Could a sectoral CDM help to improve the contribution of the CDM to sustainable development in China?

5.4 Could a sectoral CDM contribute to increase efficiency in the Chinese power sector?

5.5 Could a sectoral CDM contribute to change path-dependency in the power sector towards low-carbon or carbon-free technologies in the long run?

6. Prospects of other options

6.1 What other options could help to overcome the existing barriers?

6.2 What policies would be appropriate to drive the decarbonisation of the Chinese power sector?

6.3 What other options could improve the contribution of the CDM to sustainable development in China?

6.4 What other options could increase the efficiency of the Chinese power sector?

6.5 What other options could contribute to change path-dependency in the power sector towards low-carbon or carbon-free technologies in the long run?

Annex C: Transcribed Interviews and Summaries

***Note to the reader**: all of the interviews have been conducted, recorded and transcribed by the author. But as highlighted in Chapter 3 above, some of the experts asked not to be cited by name. This is particular sensible in a Chinese context, as open criticism might cause sever consequences. Hence, not all records are listed here.*

According to their relevance, I have transcribed some interviews completely, and summarized others.

The references in this thesis refer to the full name of the expert and the respective page in the transcription of the interview (e.g. "Interview Bodo Goerlich: 2" refers to the second page in the transcription / summary of the Interview with Bodo Goerlich).

The interviews are listed in alphabetic order of family names. Full contact details can be obtained from the author.

Interviewee:	**Bodo Goerlich**
Title/Function:	Dr., Chief Representative China
Institution:	RAG AG
Date and time:	15 May 2006, 14.00-15.00 h
Place:	Sunflower Tower

Record (summary)

CDM implementation

- The Chinese government has great expectations in CDM implementation. The government has designed the legal basis to ensure that China will benefit from the mechanism.

- The government has defined emission reductions to be a natural resource. Accordingly, the government decides on its distribution. The NDRC wants to stop direct transactions between Chinese and foreign companies. Of course, this is in contradiction with the original idea of the CDM as a project-by-project and private sector driven mechanism.
- The Chinese government knows very well that it will have to accept some kind of voluntary commitment under a future climate regime. As a consequence, they want emission reductions to remain in state or public ownership. The government has prohibited any emission reduction purchase agreement with a lifetime beyond 2012. After 2012, the certificates of still running projects could be used to fulfil the national commitment.
- The Chinese try to start more and more unilateral CDM projects. From their point of view, they have a great advantage: the Chinese has the full control over the project and the CERs.

Clean coal technologies

- The introduction of clean coal technologies will be key for decarbonisation of the power sector. Highly efficient power plants have to be deployed.
- But highly efficient plants will need highly efficient fuel. China needs to set up treatment plants (“Aufbereitungsanlagen”) for coal.
- Up to my knowledge, about half of the Chinese coal is not purified. This would mean that 150 to 200 million tons of stone remain in the coal. This huge amount has to be transported and enters the whole process of coal. Finally it is added to combustion, where it again reduces efficiency (as it is not a fuel itself and has to heated in the combustion chamber). In combustion, it is transformed to dust and has to be dumped.
- If you purify the coal beforehand, efficiency of power plants could be increased by about 5%, which is enormous. It would also be easier to dump the stones (in contrast to the dust).
- The Chinese have to do what we have done in Germany already: build highly efficient power plants (in Germany, efficiency is about 43%) and use purified coal.

- Decarbonisation of the power sector also includes carbon capture and storage technologies. But in my personal opinion this technology is still at a very early stage.

Efficiency in the power sector

- Newly constructed power plants in China use state-of-the-art technology.
- The annually constructed capacity of hard coal power plants in China equals the total installed capacity in this sector in Germany.
- It is very difficult to determine the average efficiency in the Chinese power sector. It is probably 25 to 30%, excluding newly build power plants.

Coal bed methane

- Coal bed methane is another important option to decarbonise the power sector. The Chinese government supports this strongly.
- RAG intends to buy CERs from such projects. We are currently negotiating this. In one project, RAG would be the project developer. Usually we always hold the majority in international joint ventures. But CDM is still in a starting phase, so we have a try as a minority shareholder.
- In this kind of project, it is crucial that the partner continuously delivers gas from the mine to supply our combustion plant. We have to create an incentive for our partner to deliver the gas. But his is a special case; normally a company would want to control all parts of the project.
- Of course, the certificates belong to the Chinese partner. But either the partner sells the certificates to a third party and we share the revenues – or we buy his certificates directly.
- One should not forget that the certificate itself is worthless. It is just interesting when you are able to sell it.

Mine fires

- Total emissions of mine fires amount to 60 million tons of CO2 annually. RAG has tried to introduce the extinguishing of mine fires as a CDM project activity, but NDRC did not accept this. The Chinese government is opposing this type

of project as a CDM activity because they would also have to accept the emissions of mine fires as part of Chinese anthropogenic GHG emissions. We got a very strong “no” from NDRC.

Technology transfer

- The fear to loose your technology is always there.
- RAG is not constructing power plants. We are merely planning and calculating them. It is difficult to copy such a plan, because they have to be customized for each specific situation. It is rather a problem for mass products such as cars.

Future projections / policies

- I do not think that it will be possible to decouple economic growth and carbon emissions in China – although it is certainly possible to lower emissions’ growth.
- To slow down emissions’ growth, it would be important to create a market for energy. The ones using the energy should pay accordingly. Gasoline is a good example. It is too cheap.
- We Germans should be careful. Just 40 years ago we have not talked about environmental protection at all. The situation in China is similar today. We should grant the Chinese their right to make experiences themselves.
- The Chinese are not going to put all their efforts into energy efficiency. There are other, greater problems for them.
- There are many options to avoid our [German] mistakes in terms of environmental degradation. But the question is: how can we create an incentive for the Chinese, so that they see an advantage to go another way? The CDM is not enough for that. You have think about something new.

Interviewee:	**Deng Haifeng**
Title/Function:	Researcher (post-doc)
Institution:	Tsinghua University, School of Public Policy & Management, Clean Development Mechanism Research & Development Center
Date and time:	28 March 2006, 10.30 h – 11.30 h
Place:	Tsinghua University, Wushunde Building

Record

Could you please give me short introduction of yourself?
I am a lawyer; my research area is energy, resources and environmental law. Our Centre was established last year, when the Kyoto-Protocol entered into forced. It is a policy research centre, not a technical research centre. We pay attention to the legislation, to the policy building and policy consultation connected with the Kyoto-Protocol and Chinese legislation. Law school, energy school and INET of Tsinghua University support the Centre.

[*Short introduction of the study and the methodology*]

What is your initial reaction to my outline? Do you think it is a useful research?
I think it is very useful. But firstly you will have to define a sectoral CDM in your research. What does it mean?

I would define it as a policy-based approach. So certain policies by governments qualify as CDM projects. Governments would receive the CERs directly. This would create some revenues, which would enable the government to provide incentives for companies to adopt e.g. certain efficiency standards in a sector. What do you think about this approach?

You mean that the government would take a very important role? Not only in the domestic regulation but also in the action to stimulate companies to start CDM projects?

Yes, the government would become the main project partner. The government would apply for accreditation.

You mean the government becomes one of the partners of the CDM project?

Yes, exactly. Of course, this model is not possible right now. I am talking about changing the design of a CDM under a future climate regime.

But I think there are some barriers: if you are the judge, you cannot be the client at the same time. Otherwise the procedure would be very complex. And the obligation of the government could not be designed very well.

One step back to more general questions. The Worldbank has concluded that China has a huge potential in the CDM. Why does it not meet this potential?

I think we have to do some research to learn more about this situation. We also do some analysis of the Chinese CDM potential. The reason for this situation is: The Chinese government is aware that the CDM is a good mechanism. But most of Chinese enterprises do not know the mechanism! Even though the worldwide market is huge, and a lot of money is in this market to buy the CERs from China.

Did you do research on this?

Yes, we sent questionnaires to about 200 huge national owned companies.

In which sectors?

In various sectors. Only three of those companies knew about the mechanism. Obviously, most of them cannot participate in it.

What about provincial or local governments?

Only 7 or 8 provinces have established offices to manage the CDM.

Why only so few?

Because the central focus of the government is the economic development, not pay more attentions to the environmental protection. So, the officials in local governments pay more attention to economic development. They want to establish their local GDP. They pay more attention to the figures of the GDP. They take more measures that can stimulate their economic development.

But the CDM could be such an instrument.

I know! The CDM is a great opportunity. The CDM could deliver financial support, environmental protection and technological development. But they don't know.

Are there measures under way to raise awareness?

The Chinese government did a lot of training work in the energy sectors and other sectors for governmental and companies' officials. But the training is very limited. You know maybe there are millions of enterprises in China.

If you look at the future, how do you expect the CDM to develop in China? Will there be more projects? Will the current situation improve?

There are still other barriers for CDM projects in China. The Kyoto-Protocol expires in 2012. A CDM project from application to finish generally takes 1-2 years. It is already 2006, up to next year it is the last chance for Chinese enterprises. So, a lot of enterprises' officials now think it is dangerous to do a CDM project because it is not a stable mechanism.

The third barrier: There are very weak organisations to do the work connected with enterprises and foreign buyers. There are just very few intermediaries. Enterprises cannot find overseas buyers themselves! If they do that by themselves, the costs will be very high.

Are there more barriers?

Experts are lacking, both familiar with the CDM and the technical. The CDM is not only a law procedure, not only a legislation procedure, not only an international procedure. The experts must have even more knowledge about the technical in particular. Otherwise they will not be able to design a PDD or PIN. They will not be

able to attend a CDM project from the beginning to the end. Of course it is also a law issue. You have to be familiar with Chinese law and international trade law.

If you want to make a CDM project, you need a team of experts. Not just a single person. This is very complex.

Are there any consultancies that are able to cover that?

In China, there are just very few national consultancies. There are some overseas organisations, but they are not familiar with the specific Chinese situation. They might be familiar with the CDM cycle, but not with Chinese specific.

All these barriers: that's the reason why there are so few projects registered with the UNFCCC.

Do you have knowledge of the CDM pipeline? Will Chinese companies try to use the closing window of opportunity?

The attitude of Chinese government is to stimulate more and more projects. They want companies to apply for CDM projects. But still there are the listed difficulties. Thus, there won't be to many new projects.

Let's move to the CDM application project. What does sustainable development mean in a Chinese context for the CDM? Are there any indicators for sustainable development?

You achieve sustainable development if you can reduce GHG emissions. This is the first thing. Second, if you can save energy and lower consumption, it is also useful for sustainable development.

Internationally there has been quite a lot of critique on Chinese HFC projects. Do you think they contribute to sustainable development?

Yes. If we do not do HFC projects, HFC emissions will be released to the atmosphere.

65 percent of CERs from HFC projects goes to the government. There shall be a fund to manage the revenues. Do you know any specifics?

I do not think so. There are two reasons: First, the government is the owner of natural resources. If a private entity does a CDM project, they can also obtain some financial support from the project. So, some of the profits should be given to the government to establish a fund to contribute to sustainable development of China. The Ministry of Finance connected with the NDRC has been wanted to make legislation on the use of the fund. I know, in this legislation they want a clear definition and limitation of the fund.

This is still in the process.

Yes, it is. But those two central governmental entities want to do that.

One more step back. If we consider the global climate, there are severe problems coming up. Projections show, that the Chinese power sector will make a significant contribution to future GHG growth. Thus, to prevent climate change, measures will have to be taken within the Chinese power sector. Do you think that the CDM is a suitable instrument to mitigate GHG emissions significantly?

In fact, it is a good mechanism. But it is not enough. Just as you have said – if other countries want the Chinese power sector to further reduce GHG emissions, other countries or companies shall provide financial and technical support. They can do that through the CDM and through other mechanisms as well.

Outside the Kyoto regime?

Yes, e.g. the United States have developed another mechanism to distribute advanced technology to overcome global climate warming. That is the Pacific Initiative.

Is this initiative an alternative or a supplement to the Kyoto process?

I think it is a supplement – it is helpful to reduce GHG emission. In contrast to the KP it provides a positive incentive, because it stresses technological development. If we can change energy structure and fuel mix, that means we can make a greater contribution to reduce GHG. Both regimes are useful for China.

Both initiatives have in common that foreign entities provide some kind of financial or technical support – or even both. But are there measures, which are in the interest of the Chinese government as well, which will be implemented without any foreign stimulation? Just to mention energy security …

Just this month, the Chinese government has passed a very important document, guidelines for the development plan of eleven-five. In this important document, the government has asked all entities connected with the energy sector to reduce their energy consumption per hour. In the next five years, the total energy consumption of China shall be reduced by 20 percent.

That's referring to the new FYP.

Yes. In addition, environmental pollution shall be reduced by 10 percent.

That is really ambitious.

That not only means other nations help. It is also up to us to save our environment and to save our health.

Interviewee:	**Gao Aihe**
Title/Function:	Senior Project Manager
Institution:	KfW Office Beijing
Date and time:	11 April 2006, 16.30 h – 17.30 h
Place:	KfW Office Beijing, Sunflower Tower

Record (summary)

How is KfW involved in CDM development in China?

KfW has established a CDM Fund; the volume of the first trench is 70 million Euros. With this fund, KfW seeks to purchase CERs, mainly for German, but also for other European companies. The management of the fund is located in Frankfurt am Main, Germany. The fund intends to buy CERs from all developing countries. So far, the team has visited China twice.

German and European companies set up this fund. First, they pay the money into our account. Then, we act on behave of these companies and try to buy CERs.

The German government provided an initial funding of 8 million Euros.

So far we have received 80 project proposals, mainly from European companies. 20 projects have been pre-qualified, offering a purchase potential of 10 million tons.

We also hold contacts with potential Chinese companies that plan to sell CERs. The projects qualified so far are limited to wind energy, methane gas and small hydropower.

European companies often are not familiar with the Chinese situation, so we offer our expertise. This way, the companies try to minimize their transaction costs. KfW has an office in China and is active in financial co-operation in China since several decades. This also means that we have lots of good contacts to both the government and Chinese companies.

So far, we consider buying CERs from up to five projects in China. But we received a much higher number of applications from China! We have issued a letter of support

for 1 project; we have signed a purchasing contract with another company and we are negotiating with another 2 Chinese companies. It depends on the process of biding and the final price.

How does the process work?

First, there will be a call for projects. We have a form for PINs. If there is a proposal from a Chinese company, we ask them some questions, mainly about the proceeding of the project approval, the methodology, and the financial capability of the project developer. A team of experts in Frankfurt will review the project.

Most of the proposals come from big, state owned power companies. We also offer to consult project developers.

We do some public relations, e.g. we attend relevant workshops and events. There are different ways to get in contact with Chinese companies.

How much of the potential 10 mio tons do you intend to buy in China?

There is no limitation. Also if we are able to get 10 mio tons immediately, we will think about a second trench.

How do you pick projects? Are there any indicators?

It is mainly a buyer's perspective. It is crucial whether the project developer will in fact be able to implement the project and to deliver the CERs. We also check whether the project is fit for our programme. E.g. forestry or large hydro would not qualify for our fund.

Are your clients mainly SMEs?

No, mainly big companies such as chemistry and power generation companies.

Shouldn't big companies be able to buy CERs by themselves? A number of them have offices in China.

But mainly the big rather than medium or small sized companies face the obligation to reduce CO2 emissions. If a company has a representative office in Beijing it does not imply that it also has the expertise to buy CERs.

There are a number of potential buyers in China. Is there competition?

I think each party has its own advantage. Our advantage is that we have a very good reputation and the trust of the Chinese government.

What role does technology transfer in the CDM? From you point of view, is it about promoting German technology?

For the time being, international buyers just want to buy CERs. They do not care so much about technology transfer.

From the Chinese point of view, this is a serious shortcoming of the CDM.

Yes, but it is still the very beginning of the CDM. Just a limited number of projects have been approved by the EB. There is quite some competition between buyers.

The prices for China are relatively low. If there was competition, I would expect higher prices.

For the time being, just a limited number of projects exist. But I don't think that the price compared to India is so low. Right now we try buying CERs from one project, but there are several other international buyers who try to get them! We made a price bit, and one competitor tried to overpass our price. In India in contrast, we have a competitive market. We do not want to have a higher and higher price through bidding.

What is your experience in communicating with project developers?

We have an advantage because we also speak Chinese. Actually, Chinese companies often have language problems when it comes to English. But normally they invite consulting companies anyway. We mainly communicate with those consultancies.

Big state owned companies have the capacity themselves. Their staff is trained in CDM issues. They know quite well what is going on internationally and domestically. SMEs lack the capacity.

Are the consultancies you are co-operating with from China?

Yes, they are mainly from China.

So far I just came across a very limited number of Chinese consultancies in the field of carbon trade.

I would rather say it is different from sector to sector. In each field there are consultant companies. They are very capable. These sector consultancies are very strong.

So far my respondents have identified missing intermediaries as one of the major barriers for the CDM in China.

I would rather say that the project owner is often reluctant to pay the fee for consultancies. They are not entirely sure if the project will be implemented in the end.

We try to overcome this problem by providing the opportunity to pay up to 50.000 Euros for the development of the PDD. If we are sure, that this project will be implemented, that is. The 50.000 Euros cover 50% of the PDD development. We will get the money back through the margin of CERs. Somehow we will facilitate this process. But so far we have just received proposals by Chinese consultant companies, and they cover the PDD development with their fees.

How do you expect the number of projects in China to develop?

I am optimistic. China is a big country; one day China will meet the international expectations. There are a lot of companies active in different fields. They try to sell their CERs and promote that. The current problems of the CDM are rather growing pains.

My opinion is that the NDRC and the MOST will work to improve the situation. They will try to give support the CDM in a technical sense. Tsinghua University also has great expertise. A lot of project sponsors will try to get their approved. Still, a lot of companies do not know what's going on.

What are the important institutions in this field?

ERI and CREIA are very influential and important.

Interviewee:	**Magnus Gislev**
Title/Function:	First Secretary (Environment)
Institution:	European Union, Delegation of the European Commission
Date and time:	April 20, 2006, 16.00 – 17.00 h
Place:	EU Delegation

Record (summary)

CDM implementation

- European companies have set up an informal group to launch common efforts to overcome problems of CDM implementation in China. They meet regularly to discuss related issues. I understand that one of the major problems is the so-called “49/51-issue”.
- There is the fear that the Chinese government is just interested in publicly owned CDM projects. There has been no official confirmation of this. But each potential (foreign) company is afraid to start a project; each of them is afraid to be the first one to make a bad experience.
- The CDM is certainly not adequate for supporting research and development of new technologies.

Technology transfer

- In February, the EU and China have signed a Memorandum of Understanding to set up a pilot project on carbon capture and storage technologies in China. So far, China is absolutely not willing to share any costs of that project with the EU or European companies. We have been disappointed in the beginning, but the more we talk about it with the Chinese, the more interested they become. But although CCS is a promising technology, there are still many question marks when it comes to the technical realisation.

- The official Chinese policy seems to be not to invest much own resources in climate related research of technologies.
- China has to begin to change its path of development right now. It would not be wise to wait for a “tipping technology” or a technological silver bullet. And indeed, China is already moving. They have put a number of policies into place, promoting renewable energies and energy efficiency.
- Personally, I have no doubt that the Chinese will meet their own targets when it comes to renewable energies and energy efficiency. Some foreign players are disappointed in the implementation of the renewable energy law: it is mainly about supporting and favouring domestic companies.

Future climate regime

- Technology transfer has to be enhanced. We should focus on developing policies that create demand for technology transfer. We need to develop favourable conditions for technology transfer.
- An additional fund under the UNFCCC would probably not get the support by the EU. Instead, the CDM should be continued and strengthened. Why should you have a fund in addition to the CDM?
- The discussions about sectoral approaches in emissions trading are interesting but still in the sphere of think tanks. But everybody working on climate change in an international context is aware of this discussion.
- So far, there has been no formal discussion about sectoral approaches. But it is not a wild guess to say that this issue will come in the UNFCCC and KP negotiations.

Importance of climate change

- So far, the Chinese government has not taken climate change -- or environmental issues in general – seriously enough. Instead, they have devoted all their attention to short-term economic development. It is just what Wen Jiabao has stated: the development has not been balanced. Likewise, climate change has certainly not ranked first on the political agenda. But I believe that we can trust the Chinese government if they announce that

environmental issues recently became a major concern and that they are going to do something about GHG emissions.

- To put it another way: Yes, the Chinese government seems to take climate change seriously right now. But this no guarantee for policies being effective and achieving good results.

A future cap

- In my opinion, the Chinese government will not accept an absolute cap in the next commitment period. But you could design a cap in different ways. A cap linked to GDP development might be an option. Also voluntary commitments might come up. I would regard this as a step into the right direction.
- Currently, the EU does not regard it as constructive to suggest the Chinese government to accept a cap. That would prove to be counterproductive. We rather try to raise awareness for the consequences of policy choices the Chinese government is facing.

Interviewee:	**Rebecca Gunning**
Title/Function:	Chief Representative China (MSc CEng MIMechE)
Institution:	IT Power
Date and time:	May 12, 2006, 10.00 – 11.30 h
Place:	Air China Plaza

Record (summary)

Main Barriers to implementation

- Missing information is a key obstacle. Chinese companies do not know enough about the CDM. On the one hand, there are many potential buyers and project developers. But on the other hand, knowledge about the mechanism is lacking on a local and even on a provincial level.
- The language barrier is another major obstacle. But this situation is slowly improving as Chinese companies employ more and more persons with English language skills.
- The 49/51-rule is an important barrier for any foreign investor. This rule particularly causes problems for windfarms projects and projects in chemical industry. If foreign companies transfer technology, they also want to ensure to get the revenues. This rule effectively prevents that.
- Methodologies for energy efficiency are lacking. This is particular significant in a Chinese context. Energy efficiency projects are very complex. It is more difficult to define the boundary, to determine leakage and to do the monitoring. Consequently, costs and risks are higher.
- Chinese companies do not want to take risks. And what does it tell about a project, if the project owner itself does not want to put any upfront investment in it? This increases the risk for the buyer as well.
- The legal framework was developed too late.

- The DNA constantly issues new regulations on CDM implementation. This causes some unrest in the market. Investors regard legal stability and reliability a problem. Transparency of DNA rulings is limited as well.
- Legal uncertainties are also caused by the rule that prices have to be approved by the DNA.

Exploitation of Chinese companies

- Together, missing information and language barriers offer the potential to exploit Chinese companies. Companies often have no way to learn anything better! In my opinion international project developers have exploited some Chinese companies. In one case, a Chinese company has signed up for a prize that was well below the international standard at that time. In other cases, project developers have charged up to 15% of CER revenues.
- Now, the government is aware of this. This might be the background for recent rulings of the NDRC on ownership issues.

Additionality

- The additionality of some renewable energy projects could be questioned, for hydropower projects in particular. Most renewable energy projects would be implemented without additional revenues through CERs.
- The picture is quite different for energy efficiency projects. They would definitely be additional.

Recent improvements

- There has been a large number of capacity building projects. The number of provincial CDM centres is growing. Information on the existence of the CDM is spread more widely.
- The NDRC actively encourages projects. They offered local project owners to find someone for them to write the PDD.

Discussing barriers

- There are a number of consultancies working on CDM issues. Probably the number is low if put into perspective in this huge country. On the other hand, there is competition between consultancies already.
- I do not think that a missing Chinese DOE is a barrier. DOEs already employ Chinese staff. Setting up a Chinese DOE would just enable a Chinese company to gain the revenues.
- The issue of CER ownership does not have any practical effect.
- I do not perceive the taxation to be an obstacle.

Political issues

- In energy politics, climate considerations are not important. Although no one of the Chinese government is going to admit this, energy security drives everything. On the other hand, the Chinese government wants to be seen showing that climate change is an important issue.
- Consequently, the Chinese government will continue to work on energy efficiency because it is also going to improve energy security.
- In my opinion, the energy efficiency objective set out in the 11th FYP is very ambitious. But I think it is achievable, simply because many things are so inefficient. Successful implementation will depend on strict enforcement. Incentives and penalties will have to be put into place. Of course, the CDM is a potential incentive.

New approaches to the CDM (basis: outline of policy CDM)

- The HFC-23 projects could have been done under a policy as well. This would be a positive example for the feasibility of this model. On the other hand, you could argue that such a policy should have been adopted anyway.
- It would be difficult to argue whether a policy is additional or not. And it might happen that an already existing policy suddenly becomes enforceable.
- Such a model could work, but China is so big! HFC for example, you could have done that under a policy. You could argue that you should do this under a policy.

- A rather difficult question seems to be who actually gets the money. How to distribute it to project owners?
- The model seems to be an option for the transport sector. A policy or a standard could require a certain efficiency of engines. You could simply dictate a standard that has to be adopted by manufactures. It is also relatively easy to give them money for the technical development.
- The model is a nice, but very big option in China. Just consider the efficiency improvements that are possible in the construction sector.

Interviewee:	**Frank E. Haugwitz**
Title/Function:	Technical Adviser Renewable Energy Technologies
Institution:	GTZ
Date and time:	3 April 2006, 9.00 h – 10.00 h
Place:	GTZ Office, Tayuan Diplomatic Office Bldg.

Record (summary)

- There is a conflict of goals: On the one hand, the NDRC wants to stimulate participation in the CDM to generate investments in the power sector (this would also serve the goal to enhance energy security). On the other hand, the NDRC does not want to give the "low hanging fruits" in GHG reduction away, because China might face a binding cap under a future climate regime. This conflict leads to a deadlock and to a rather reluctant approach towards the CDM.
- China's approach towards the CDM has changed. Whereas it has first been very sceptical, it now hails the CDM as an important mechanism for technology transfer, GHG mitigation and sustainable development in host countries.
- Besides the rhetoric, China perceives the CDM to be an instrument for creating new investments. It is not considered from an environmental point of view. Thus, the NDRC is responsible (not SEPA).
- The CDM creates an incentive for SEPA to become active. The CDM might enhance SEPA's share of self-financing (Selbstfinanzierungsanteil). Nevertheless, there is no real conflict between NDRC and SEPA. Although SEPA would like to play a stronger role in the CDM, NDRC is the leading authority. SEPA does not challenge this.
- China has failed to create an acceptable environment for CDM implementation so far. There are various barriers.

- Within the NDRC, just four persons are working on the CDM. The capacity is very limited. The NDRC expects companies to take a proactive approach and to develop CDM projects by themselves.
- Tsinghua University has acquired in-depth knowledge on the CDM and its procedures. But outside Beijing, capacity is still lacking. Neither companies nor provincial authorities have to capacity to start CDM projects on a large scale.
- Intellectual property rights are still a very important issue for foreign companies. Weak legal protection in China remains to be a major barrier for technology transfer.
- The Worldbank study has not have a significant effect. Its title reflects a major conflict: from the Worldbank's point of view, it is a national strategy study. But China cannot accept the term "strategy"; this would imply that the Worldbank interferes with Chinese sovereignty. Thus, the title of the study was changed.

Interviewee:	**Jiang Kejun**
Title/Function:	Director ERI, Research Professor, Ph.D.
Institution:	Energy System Analysis and Market Analysis Division, Energy Research Institute, National Development and Reform Commission
Date and time:	April 5, 2006, 10.30 h – 11.30 h
Place:	Energy Research Institute

Record (summarized)

What is the role of the Energy Research Institute in the policy-making process?
The ERI belongs to the NDRC. Our major task is to provide policy assessments and technical support for policy makers. I am myself mainly working on modelling of energy and GHG emission development. We develop projections for both China and the world, also taking policy options into account.

We also work on domestic energy politics. They have very strong relationships with climate issues. For example we are working on energy and carbon taxes.

Could you please elaborate on that?

We have developed a roadmap for different taxes. Our objective is to establish a carbon tax. But we will do it step by step. First, we propose to introduce a fuel tax. This should be implemented very soon, in 2007, i.e. within the 11th FYP. Second, we propose the introduction of an energy tax by 2010; and finally the introduction of a carbon tax by 2015-20. In my opinion, the energy tax is most important. We will strongly recommend the government to put it into practice.

Energy and carbon taxes are closely connected. But we will rather focus on the energy tax, because some decision-makers do not yet regard a carbon tax as a feasible option. So we start talking about the energy tax, bearing in mind its close relationship with the carbon tax. It is easier for people within the NDRC to consider

the use of an energy tax. To create an additional incentive, renewable energies would not be subject to such a tax.

These recommendations are based on a study supported by the US-based Energy Foundation. At the end of the year, the project will be concluded. Then, we will go forward and promote the results. I expect a positive response by the government.

We have also made an assessment of a SO2-emission tax. But its implementation is already under way. So we focus on the carbon-related issues.

Let's move to energy and emission projections. Could you please summarize the key trends very briefly?

Our key question is: what are the policy options for China to change emissions' growth? In order to find an answer, we also work on long-term projections. It will proof difficult to change China's emission trends before 2030: the current infrastructure will last for about 30 years. Right now we deploy conventional technology. But we do hope that we can achieve a strong change in a longer term, maybe within 50 years.

Why not try to stimulate change right now? The strong growth of the energy sector could provide an opportunity to deploy more efficient technologies.

We strongly push for that. The Chinese government already did a lot for this. But from a climate point of view I think this is not enough. Even if we use supercritical or ultracritical power plants – it will not be enough! We need something like integrated coal combined-cycle technologies (ICCC). It is our recommendation to intensify investments on research and development of ICCC and clean coal technologies.

What is your motivation to achieve a change in emission trends?

The main reason is climate change. Other important issues include domestic environmental pollution like air and water pollution. Another very important factor is domestic energy security.

What are the options for changing the emission trends?

There are two options, if we want to achieve the 550ppm or 450ppm target by 2150: On the one hand, we can start early to reduce emissions smoothly. On the other hand, we can wait and achieve radical reductions later. This depends mainly on the technology development.

We already started efforts to pave the way for both options. We should focus on very specific technology policies. The China-EU-Partnership could be able to promote new technologies.

E.g. CCS technologies?

No, actually I do not like CCS technologies. They imply an increase of 10-30% of energy use. That would be terrible for China. In opposition to this, we will have to implement measures to reduce energy demand.

The European programme to develop the nuclear ITER technology is a very interesting project. This can serve as a model for jointly developing a new technology. If the project manages to achieve its targets, to reach the commercial level by 2050, there will be no more GHG emissions in 2080! This would be a very important option for China as well.

Other options include offshore windparks or solar PV systems, if their efficiency levels go up to 23-25%. Their costs might fall lower then those for power plants.

But so far the share of coal is growing.

But if we have any technology like this, the share of coal will be reduced to less than 50%. It might even fall lower. But what I worry about is: what happens in 20, 30 years, considering the current, high share of coal. And another problem is that I do not see a clear policy to promote other options within the next 10 years. Be it combined cycle, nuclear or renewable energies.

What about the renewable energy law?

The share of renewables is still too small for a significant contribution – even though we implemented good policies. And its share will remain low in 2020 or 2030. And it is not a good way to go anyway because of the high costs. Instead we could do a lot promoting clean coal technologies.

What would be a clear signal to change development?

The 11th FYP provides an example: the reduction of energy intensity by 20% from 2005 to 2020. Both the central and the local governments will have to take actions now to achieve this objective. I just worry, that there might be opposition from local governments. On the one hand, they are under high pressure by the central government. On the other hand, they are mainly concerned with local economic growth; they try to attract energy intensive industries. Local environmental pollution might be able to provide an incentive for them to comply.

Why did the government choose 2005 as base year? The data is not yet available for that year, is it?

The base year was chosen according to the start of the 11th FYP. This way it is easier for the government to set a target.

Does the government consider any specific policies to create an incentive for local authorities to comply?

There are incentives. First, there are energy efficiency standards. If products do not comply, they will not be able to go to the market. For vehicles, a second, improved standard will be announced this year.

Second, there will be new forms of taxes and subsidies. I already elaborated on the taxes. In addition, there will be subsidies for renewable energies, energy efficient building material and maybe even direct subsidies for the Toyota Pirus.

Let us move to the Clean Development Mechanism. Is your work connected with that?

The CDM is part of our work. We have been the first group working on methodologies and baselines in China. But now the research work on the CDM has been finished. Now it is up to business.

My centre actually manages the CDM process, and NDRC will establish a CDM administration centre within the ERI.

From my point of view, the main problem of the CDM is that it is open for all kinds applications. But we still want to control the direction. E.g. we would like to slow down the development of wind and small hydro and shift the focus of the CDM to other areas. These are my proposals; of course it is the government's decision.

Why not wind and small hydro?

There are already many wind projects. We should rather be looking at the areas, which really need support for GHG reductions, and which contribute to the local environmental situation and sustainable development. As for wind projects: even without the CDM there is a lot of money available.

How do you want to slow down the development of wind and small hydro?

Recently, we have just received very limited applications for wind projects. On the other hand we encourage other projects to apply for approval. We do not plan to increase the CER-tax for those projects.

What role will the CDM play in a future climate regime?

I am not very optimistic. So far the CDM is a bilateral instrument. We have to think about how to make a real effort to support emission reductions in China. Wind energy could be one part, but if we use the same money energy efficiency or fuel switch. They have a much greater potential than wind.

What about HFC projects?

We support those projects, but we will collect 65% of the CER revenues for the CDM Fund. Personally, I do not like HFC projects. They do not contribute to a change in the emission trends. Just what I have said: if we want to achieve change within the next 50 years, we have to work right now. We cannot simply wait till we have a new technology. Unfortunately, the Kyoto-Protocol does not provide any help for technology development.

There are some serious barriers, like the issue of ownership.

I believe this does not matter. I strongly support the idea that technology transfer can happen on a commercial base. Look at the European car manufactures: they can produce their cars here even though it is 100% owned by them. But: China can enjoy the new technology. That is important. I always recommend to the government to give up the idea that the Chinese should own this technology. That is nonsense! Just let Chinese people enjoy the technology!

What role could the CDM play for technology transfer?

I hope that the CDM projects can bring new technologies. But so far, this does not happen.

Why are there so few projects in the power sector?

We have to work more on this. There will be a Worldbank project to set up methodologies for energy efficiency. In the meantime we encourage a lot of people from the energy efficiency sector to develop projects. So far it is mainly wind – the wind people now the CDM very well. But people from the efficiency sector often hear about the CDM for the first time. We need more time.

[*Introduction of a policy-based CDM on basis of the outline "Defining a policy-based (sectoral) CDM"*]

I like this idea. Actually we look at something similar.

I think the Kyoto-Protocol would be a very convenient framework because it is able to stimulate demand for CERs (or any emission reduction units).

Yes, that is a good topic. We have to rethink whether the exiting Kyoto-Process can bring very big changes in the next 30 years.

The caps are not strong enough. Germany can go to much lower emissions than they have promised. Japan also wants to join. The US is working on new technologies; if they are ready, they will also be able to reduce.

But the problem is: how to support achieve the overall 550ppm target? As a researcher, I care about what is the policy we need to reach that target? From my

point of view: first, China should use energy taxes; second, China should use energy efficiency standards. That is the process we are in right now.

As a scientist, I do not care so much about the 5,2% emission reductions promised by the Kyoto-Protocol. I rather have to check if the NDRC wants to introduce the second fuel efficiency standard by this years or next year. We have to focus on more concrete technological issues. What is the schedule for ICCC to go to China? When does offshore-wind come to China? If we don't have this schedule, the target is nonsense. So we have to go to this level of discussion. The Kyoto-Process takes too long for us.

It takes too long for China?

It takes too long from a global perspective as well. I am an environmentalist! I want to go faster than we do now. Okay, we support Kyoto. But this is one way. Maybe China even thinks about some target in the next commitment period. Yes, this serious. But we also look carefully on the EU-China-Partnership. We cannot rely only on one option, because we have to move faster! The post-Kyoto regime will again cover political issues. And people of the foreign ministry think mainly about international relations, not about energy or environmental issues.

What about other initiatives, the Asian Pacific Initiative in particular.

It is also quite good. This June there will be a second meeting. Now we have only established working groups on major industries like aluminium, steel, and cement. But China has not yet made up its mind. My team is working on this. We try to get some budget from the US or Japan to help us to give a clear picture of what China wants from the API.

Isn't that obvious? Financial support for change in major sectors or industries?

Yes, we will propose to receive some 50 million US-Dollars a year. Australia gives 100 Million Australian Dollars for 5 years. It is not clear what the Japanese government indents to give. This is only in the very beginning. The other partners do not know what API is about, either.

China is currently co-operating with India to get a clear picture of what the API could deliver. We are looking at very concrete targets in the cement sector, e.g..

I hope that the API will be able to promote clean coal technologies like ICCC. This becomes more urgent, as in Europe the budgets for ICCC have been reduced, because coal is phased out. If everybody reduces the budget for ICCC research, this will be very bad for China. Of course, China can spend some money on this. But we would rather like to establish a research group like the ITER. A few key technologies could contribute to a real breakthrough! But: even if China has the money, we lack the scientific capacity and knowledge. Thus we need to co-operate with richer countries.

Could China accept a commitment under a post Kyoto-Regime?

This is possible. For example: in China, the energy people always laugh about the climate people. The energy issues are moving very fast, look at the 20%-intensity goal in the 11th FYP for example. So why not take a 10%-goal under the Kyoto protocol? Why not? Only when you join the game, you will be able to change it. If you are always outside the game, what can you gain?

I advise the policy-makers to take this view – join the game. Unfortunately, we lost Gao Feng, who was head of the Chinese delegation, he was director genera of the environment department in the ministry of foreign affairs. Now he lives in Bonn and works for the UNFCCC.

Personally I strongly recommend policy-makers to take a commitment. Our strategy should be to use the climate change regime to tackle on domestic energy and environmental problems at the same time.

Interviewee:	**Sara Leggio and Carlo Ferrara**
Title/Function:	Project supervisors
Institution:	Sino-Italian Cooperation Program for Environmental Protection
Date and time:	April 6, 2006, 17.00 h – 18.30 h
Place:	Oriental Kenzo-Office Building

Record (summary)

Sino-Italian Co-operation

- The Sino-Italian "Cooperation Program for Environmental Protection" includes capacity building for the CDM. The capacity buidling is implemented in co-operation with the NDRC and UNDP. The project has started three years ago; results include five capacity-building workshops in different provinces and the website www.cdm.ccchina.gov.cn. The workshops were particular successful, as a result 40 PINs were developed, though not all of them in good quality. The first Chinese CDM project (Huitengxile Windfarm) was initiated through the programme.
- The Sino-Italian Program seeks to act as an intermediary between Chinese project owners and Italian companies willing to buy CERs. Since many Italian companies are too small to come to China themselves, the Program provides some services for them.
- In addition, big companies like ENEL also work by themselves. ENEL e.g. has reached several memorandums of understanding (MoUs) with Chinese project developers.
- With regard to the CDM, we focus on areas were Italian technology can be deployed. This is mainly biomass, hydropower, landfill, energy efficiency and cogeneration.
- The overall budget of the Program has been 147 million Euros since 2000.

Blackbox NDRC

- It is difficult to look inside the NDRC. However, the NDRC is the Chinese focal point for CDM and co-ordinates the process. If technical expertise is needed, SEPA takes a leading role. In this regard, main areas are landfill, N2O and HFC. In other areas, such as energy efficiency, NDRC takes the leading role.
- Inside NDRC, the Energy Research Institute (ERI) plays a very important role as a think tank. ERI prepares recommendations for legislation and specific policies. It also assesses existing legislation. Their research has great influence on policy-makers.

Evaluation of CDM projects in China

- The Chinese approval process took up speed in recent months. Whereas there were just very view projects delivered for approval last year, new projects are submitted almost on a daily basis now. As of today, there are 25 projects officially approved by the DNA, 5 are in the pipeline and 10 received the letter of no objective. Last September, just 7 projects were in the pipeline. Thus, we conclude that the CDM is working quite well in China.
- In our own database, we even have a higher number of projects. We have collected details of more than 100 projects in China. Most of them have already developed a PIN.
- Even though there are a relatively small number of projects registered at the UNFCC, China is already the biggest provider of CERs. This also indicates that the implementation of CDM in China is successful.
- The high number of projects in the pipeline indicates, that more time is needed. Because of the issue of ownership, buyers and sellers of CERs have to be brought together. We should keep in mind that the CDM is still a new concept for both Chinese and foreign companies.
- The issue of ownership is a major barrier for CDM implementation. Investors are scarred away buy this rule, especially if they want to provide new technologies.
- The issue of ownership also causes some kind of a distortion of the principle idea of the CDM. Anyway, this is not necessarily a bad thing from the pure buyer’s perspective.

- It is crucial for Chinese projects to find a buyer for the CERs. If there is now buyer, the project owner will not develop a PDDs. He will not be willing to take the high costs.
- The Chinese DNA plays its role very well. It is strict on the rules. So far, all projects approved by the Chinese DNA have been approved by the EB as well. This makes the market more reliable. Unlike India, the Chinese have been clever enough to develop such a serious framework first.
- Compared to India, the second advantage of China is that the government did not try to push up the prize. In India, the minimum prize is 9-10 Dollars. In China it is much lower. This is a buyer perspective. Due to the ownership rules, it is not interesting for foreign companies to become the project owner. So this is important.
- Chinese consultancies working in the CDM market are often offsprings of the six major power companies.

HFC-23 projects

- It is not true that HFC-23 projects do not contribute to local sustainable development. The Chinese government will collect 65% of the CER revenues; the government does not want to leave those big profits to the project owner. This is why the Italian government also buys CERs from HFC-23 projects. But right now we do not look for other industrial possessing projects, but for renewable energies. Before the Italian government bought CERs from HFC-23 projects, we made sure that the government started a dialogue with the Worldbank on the use of the revenues and the design of a fund.
- It is still too early to give a clear picture on the fund. There is no money yet.
- In the beginning, the Italian government funded activities to identify the potential of HFC projects. Firstly, the plant owners did not now about their potential at all! Then, in co-operation with the Worldbank, the existing projects were developed.
- The CERs bought by the Italian government from HFC projects has to be seen in a wider perspective. We did a lot of projects without any returns since 2000. The HFC-23 projects provide us with the opportunity for some co-financing.

- Not all remaining HFC plants in China are eligible for the CDM, because their status is so bad that they would not pass due diligence. But still there might be two more projects.
- The demand for HCFC-22 will grow with or without CDM in developing countries. So the CDM should be used to solve the HFC-23 problem. More and more plants will be moved to developing countries, because HCFC-22 it is phased out in Europe (see Montreal Protocol). But nobody will set up plants just to destroy the HFC-23.

Unilateral projects

- First, China opposed unilateral projects. But when the EB in Bonn took a positive approach, the Chinese government followed. Right now there is one unilateral project in the pipeline, another one has already been approved.
- But it is a problem that unilateral projects tend not to contribute to technology transfer. But if you consider this from a buyer's point of view, it is not a problem. Actually, even unilateral CDM projects could contribute to technology transfer: if the project developer buys the technology. This way, the European provider of the technology is not involved in terms of project equity, but the technology is transferred anyway.

Sectoral approaches to the CDM

- We are familiar with sectoral approaches, although we did not receive any official statement on this by the Chinese government. It could be a very good option for the CDM. In particular because certain kinds of CDM it is important to find a better framework.
- At COP/MOP1 sectoral approaches have been discussed at different side events.
- A sectoral CDM might be a first step towards a cap for developing countries.
- One model discussed in Montreal suggested having voluntary, non-binding commitments for different sectors. If you want to develop a CDM project, you would have to exceed these commitments. The projects would have to be additional to these baselines.

- Another approach would be a programmatic or policy-based CDM. This would imply the government to take action.
- Such an approach could help to meet China’s huge potential.
- A policy-based approach could also help to channel different activities under one framework. This could be particular interesting in China, where legislation is usually separated into a framework law and implementing directives. It could also provide additional incentives to implement existing policies.

Interviewee:	**Liu Deshun**
Title/Function:	Professor
Institution:	Deputy Secretary General China Energy Research Society (CERS), Institute of Nuclear & New Energy Technology (INET), Global Climate Change Institute (GCCI), Tsinghua University
Date and time:	April 7, 2006, 17.00 – 19.00 h
Place:	Energy Science Building, Tsinghua University

Record (summary)

What are main factors influencing Chinese climate politics?

In an international context, multilateral negotiations have a very strong influence. The COPs are of particular importance. But bilateral negotiations also exercise a considerable influence. The exchange of views and mutual understanding of different partners is prerequisite for any compromise.

In an international context, there is also some pressure from foreign politicians who try to persuade China to take an emission reduction commitment. In this regard, China has a general position:

First, the principles of the UNFCCC should be followed. Namely the common but differentiated responsibilities. This means, that Annex I-countries have to take the lead and that they are obliged to reduce emissions. On the other hand, non-Annex I-countries like China do not face a commitment. Their emissions are allowed to grow to some extend in the future in order to meet their social and economic needs.

Second, it is the priority of developing countries to develop the economy, to improve living standards and to eliminate poverty. This implies that they are not able to take any commitment.

Another principle says, that emission reductions can be implemented jointly by both developed and developing countries. The CDM is a good example, as is the former AIJ.

Yet another principle says that Annex I-countries have to provide financial contributions to help non-Annex I-countries to develop the capacity to deal with climate change.

Following theses principles, China – in co-operation with the G77 – has contributed to the international negotiations. These fundamental principles were the basis for the successful conclusion of those negotiations. Personally I think it was a very successful way for the international community to deal with such a problem.

I also think that the Kyoto-Process was a very successful way to create concrete measures and to start actions to tackle climate change. And we need action! The CDM could play a kind of technical role to involve the international community in actions based upon the common but differentiated responsibilities.

Do you think that the CDM currently meets this objective?

In total, the CDM regime is designed properly for this objective. But the CDM is very complex. Many stakeholders have to be included in order to ensure its environmental integrity, its transparency, and accuracy. The CDM is a first step. We have to learn our lessons and find opportunities for improvement.

What has to be improved, the domestic implementation or the design of the instrument?

From my point of view, the whole procedure is very time consuming. It also requires a lot of manpower. Naturally, no one would have been so clever to design a perfect mechanism right at the beginning! This is a necessary first step. And I definitely do not think we should stop it right now.

The Worldbank has identified a huge potential for the CDM in China. But why are there such a limited number of projects?

If you evaluate the success of the CDM in China, you can choose different indicators. One indicator is the number of projects. In this regards, it is true that the number of projects that have been registered or have been approved domestically is much less than that of India.

Another indicator is the expected emission reductions from the approved projects. Here you will find that China ranks first! This is very interesting. The reason is the

HFC projects. I have been involved in one of them. But there are only very view HFC projects available in China. The situation is quite different for energy projects. You could find them everywhere. So we should not forget ourselves; we still need to develop as much energy generation projects as possible.

Still, the question remains: why are there just a limited number of projects?

First, information and awareness are still lacking in the relevant industries. Even though a lot of capacity building has been done, the information has not been passed. We still need some time to go further. You also have to consider the size of the country: if we conduct a workshop, there are maybe about 200 participants. But in China this is close to nothing. What we need are companies who give good examples within their sector.

Second, intermediaries and consultancies are missing. They have the potential to bridge the gap between Chinese suppliers of CERs and buyers from foreign companies. This is a new market. But in China, as a whole, the consultancy market is very week e.g. compared to India. The number of consultancies is limited, and just a few of them are working on the CDM. This role, consultancies advertising the CDM, is missing.

Third, many small and medium companies (SMC) lack the funds to start CDM projects, even if they are interested. They do not have the capacity to take the risks; they need upfront financing. On the other hand, just very view financial support is available for them.

Large companies, like the energy companies, face two different problems. First, they do not dare to make a decision on the CDM themselves because the government owns them. These companies will not start to develop a project without a formal document by the government requesting them to do so. Second, the potential projects on the supply-side (e.g. supercritical coal or natural gas fuel switch) are very big of scope. A huge amount of investment is needed! So they behave risk averse, they have to assure that there is no risk in developing a CDM project. At this point they might find out that the project is promising – but no approved methodology is available. They ask me: can this project be approved without a methodology? Of course it cannot! Then they ask me to develop a methodology. But it is up to them! They are the project owner! But they cannot be sure, if the methodology will be

approved by the EB. What will happen if the approval is denied? The company will not only loose the money, it will also loose face! This is particular important to Chinese power companies. They try to become top-power-companies in the world. Finally, other country will have to develop and approve the methodologies. Then the Chinese companies will follow. They try to avoid the risk.

There are just very view methodologies proposed for energy supply projects. In opposition to that, there are many energy efficiency projects including electricity generation on demand side. The other energy methodologies are very small, something like 80MW or 100 MW. To put this into perspective: For the supply side it should be about 1.000 MW, maybe just 800 or 600 MW. This is a very concrete barrier faced by Chinese companies.

A fourth barrier is the language-barrier. Whereas English is a working language in India, it is not in China. Thus, it takes much more time to develop PDDs.

Fifth, data availability is a problem, especially grid-data. This data is very essential for baseline-determination for grid-connected projects (e.g. for methodology AM0002). Even after first reforms in this sector, the big power companies are not willing to release required data. The only data available is that published in the Chinese Electricity Yearbook. But you will not find the required data on plant level in that. Fortunately, this situation is improving. A DOE has made the proposal to the EB, asking for deviation in the application of ACM0002. This has been approved. Now, China will be able to use aggregated data, which is not on plant level. It is an average factor for the energy mix provided by the grid. But the condition is: the best available technology has to be assumed for operating power plants. This way, the baseline will be more conservative.

Finally, all projects in one region will be able to use the same baseline. This will be much better than using developing a baseline for each project! We expect a formal publication by the government or the DNA. This particular Chinese problem has slowed down the development of projects.

I would also like to elaborate on another specific Chinese point. In China, a domestic approval of the PDD is required. A domestic CDM board takes care of this. In India or Brazil, this additional domestic approval of the PDD is not required. From my point of view, this does not represent a barrier to CDM development in China. It just assures the high quality of PDDs developed in China. The government will even invite

domestic experts to review the PDDs and ask the project developer for improvements, based on the guidance by the EB.

From my point of view, this procedure lowers the risk for project developers.

In the beginning of our discussion you have mentioned that there is a high pressure on China to accept a commitment under a future climate regime. If there are more CDM projects, won't China give away all the "low hanging fruits"?

This is a frequently asked question. There are two related aspects.

On the one hand, natural resources are limited, such as for wind or hydropower. If you develop faster, you will have less reserved for the future. It is China's priority to improve the living standard of the people. So the potential of these resources will be utilized now. But it is also a priority to increase energy efficiency and to save energy. So resources will be preserved. So it is not just one answer.

On the other hand, I would argue that this question is not related to the CDM at all. The CDM is just a supplementary tool in the Chinese development strategy. Due to the domestic Chinese objectives to develop and deploy advanced technologies, the business as usual scenario will change anyway. So you might be able to build supercritical coal project today and get it approved as CDM project. You won't have this chance in the future, when supercritical coal has become part of the BAU. The project will have lost its additionality. The key is: the CDM is just a supplemental tool. It won't change the BAU itself – but the domestic policies of the Chinese government will.

I rather worry why you cannot use clean energy now? What are the barriers for the clean energy to be used? That is the point. We are not position to worry about what happens if those resources have been exhausted by the CDM.

I would like to move to another point, to sectoral approaches. Are you familiar with sectoral approaches?

[*presenting the outline of a sectoral approach*]

Sectoral approaches to the CDM are not a new issue. It was already discussed during COP 5, COP 6, and COP 7. At that time there was an academic discussion, which entered into the political debate. The question was whether we should develop a sectoral or policy-level baseline. At that time it was concluded, that the nature of the CDM, which is project-based, requires the baseline to be project-based as well.

This could be changed in a future regime.

Of course. But why was the sectoral CDM dismissed at that time? For two main reasons, first of all for technical reasons. The Chinese power sector can serve as an example: you will not be able to set one baseline at a sector level, like a single indicator for energy intensity per kW/h. There are different kinds of fuels for generation, different scales of power stations capacity, and different sizes of plants. All this will cause different efficiencies. You cannot give one indicator to cover all those differences. Second, the coal quality is quite different in each province. This also makes it extremely difficult to use one baseline for different areas in China. So, from a technical point of view, it is not wise to fix only one baseline for the power sector in China.

But the average emission factor for grid-connected CDM projects might be a solution. You could use regional baselines.

Yes, the new guideline by the EB requires you to use provincial or even national data if you cannot clearly define the boundary of the project or grid. Because there are regional grids in China, we will use them for baseline calculation.

This way, China can use the upper grid data. This was a particular treatment to overcome the data availability. It just applies to this particular situation. This is not a question connected with a policy-based CDM.

How do you evaluate a policy-based approach to the CDM in general?

I think there are serious issues regarding monitoring and verification of emission reductions. But still, it is my understanding that emission reductions have to be done through project activities. Without project activities, how can you achieve emission reductions? So this is the idea why we designed the CDM as a project based

mechanism in the first place. If you move to a policy-based CDM, you will have to answer these questions. The accounting of emission reductions will be very hard.

Another critical issue touches upon government's responsibilities. If you set up a baseline at a sectoral or national level, the government will have to take the responsibility. If it accepts the baseline, it will have to put some effort in exceeding it. This will mean a major shift of responsibility! This consideration was another reason, why the idea of a sectoral baseline was not approved earlier.

The CDM shall not impose any kind of emission reduction commitment upon the host country. Politically, this is a very sensitive issue. The government will not accept that, because it implies some kind of commitment. This is opposing the current principles of the UNFCCC and the Kyoto-Protocol. This should be taken into account if we discuss the feasibility of this option.

Do you think there is any chance that the Chinese government will accept a commitment under a future climate regime?

This is a very critical issue. There is no clear answer. It is politically very sensible. Unfortunately, I did not participate in the government's delegation to COP 11 and the COPs before, although have been involved in the negotiations before COP 7. Consequently, I am not very familiar with the current views of the government on this issue.

But generally speaking, these are very hard negotiations between developing and developed countries. How to begin such a negotiation? The government agreed to negotiate on the follow-up of the Kyoto-Protocol. This means that they have agreed to participate in the process. But what is it contents? What will be the main issues? This process is still open.

Has the internal decision-making process in China been concluded?

These issues are labelled top-security for the government delegation. The government will not announce or conclude their decisions without the detailed negotiation process with the G77 and the Annex-I-countries.

If you look at domestic policies in China, it should also be able to accept some kind of commitment.

I would like to stress two points. First, even if China does not accept any commitment, it will take a very responsible attitude and also actions to deal with climate change. All countries have to take these global issues very serious, and so China will also have to mitigate emissions anyhow – whether there is a commitment or not

Second, mitigating climate change impacts and policies related to global climate change should be integrated into the domestic sustainable strategy of China. There are no conflicts at all! If we want to reduce GHG emissions, we will have to promote energy efficiency and renewable energy. We will also have to use clean or low carbon energy. We will have to invest in afforestation.

These policies are fully compatible with the national sustainable development strategy! It is in line with enhancing energy security. China does not have enough energy supply, in particular not if calculated per capita. So we have to use energy more efficiently. China also suffers from environmental pollution and transportation growth. This also implies to use resources in a more environmental friendly way. There are many accidents in mining, so if we extract coalbed methane, we will benefit both the workers by increasing security and the global climate by utilizing the methane.

The economy has to be developed in a scientific way. Our society shall be a recourse saving and environmental friendly one. These are very common political words in China! We shall establish a harmonious society, harmonious meaning the harmony between humankind and nature, but also the harmony between current and future generations! This is a major point for sustainable development!

The 11th FYP indicates that China takes actions: Wen Jiabao has announced that that the energy intensity will be reduced by 20 percent from 2005-20! This is the very first time such indicators have been announced at a national level by the most senior political leaders! This implies a national effort has to be done to meet this target. This is associated with emission reductions; it will certainly result in reductions.

But will the administration stick to these nice words?

In our political system, options will be discussed at different levels. Representatives from different levels and sectors will make their contributions. If an issue is widely accepted, they will come forward. If it is not, discussion will go on. So, the discussion

has already taken place on the energy-intensity-goal. Now we will implement this! Personally I fully agree with this goal. I was happy to see the prime minister to announce this figure. Now it has to be divided into sectors to see, which sector has to achieve what portion?

Who develops those sector specific targets?
NDRC does it itself. But they will get support. Of course by the ERI, but Tsinghua University will also participate with studies. Several of my colleagues are chief policy advisors to the government.

Interviewee:	**Lu Guoqiang**
Title/Function:	Ph.D., CDM Working Unit, Foreign Economic Cooperation Office
Institution:	China State Environmental Protection Administration
Date and time:	May 24, 2006, 10.30 – 11.30 h
Place:	HBF office

Record (summary)

Institutional setting

- Within the National CDM Board, each member has the right to comment any project or issue. Thus, SEPA is not only focused on local environmental protection.
- Traditionally, SPEA has a great expertise in issues related to chemical processing, e.g. HFC. But this does not imply that SEPA does not work on energy issues as well.

HFC

- All HFC project are certified according to international CDM rules. HFC projects in China exactly follow the CDM process. So I do not see any justification to criticise China for implementing this type of project.
- Annex I countries have a great demand for CERs. HFC projects offer a very efficient way to satisfy this demand. The CERs generated by HFC projects in China are urgently needed by Annex I countries to fulfil their commitments under the Kyoto-Protocol.
- The priority areas set by the Chinese government have a greater impact on sustainable development. But these types of projects need a lot of investments; there are high technical barriers and implementing projects takes a long time. Lastly, these types of projects generate just a very limited number of CERs – not enough to satisfy demand by Annex I countries.

- In my opinion, we should start with the easiest projects. HFC is a very easy type of project because the methodology was the first that was developed. On the other hand, it creates big benefits in terms of CERs. When we have learned the lessons, we can move to more complicated projects.
- There are four more companies manufacturing HCFC-22 in China. Currently, their facilities are not eligible to the CDM because they are owned by foreign enterprises. But three of those four prepare a restructuring of the ownership, so that they can become eligible for the CDM.
- It is a guess, if someone says that HCFC-22 production will increase in developing countries due to the additional benefits created by the CDM. So far, there is no evidence for this. But normally I would expect it to happen. It is practically very difficult to stop companies doing that.
- On a global scale, China currently accounts for a very low number of CDM projects. On the other hand, it accounts for most of the CERs generated until 2012. This is China's special contribution. In the beginning, we just had a very limited capacity to administer CDM projects. Under these difficult conditions, we selected the right projects. The Chinese approach to the CDM is a very efficient one.

Sustainability impact

- The potential contribution to sustainable development is very significant in all sectors.
- Now there are a lot of wind farm projects approved by the DNA, enhancing the implementation of renewable energies in China.
- Landfill methane will contribute quite a lot due to the positive effects on waste management and treatment.

Potential of the CDM

- If the CDM is capable to reach its potential, depends on how it is used. After all it is not the only flexible mechanism under the Kyoto-Protocol. The CDM has indeed a great potential in China to reach many objectives
- So far, the CDM has a very limited impact on the power sector.

Barriers to implementation (based on the document "main barriers to CDM implementation")

- Lacking awareness is a problem, in particular on a provincial level. But there is also a huge number of both Chinese and foreign companies that do not know about the CDM.
- A missing Chinese DOE is not a barrier. In the beginning, there was no competition in this market segment. Consequently, fees for certification and validation were high. But now there are many DOEs operating in China. This competition had positive effects on the price. A Chinese DOE would not change this further.
- I do not think that the legal framework was developed late. Compared to other developing countries, China was well in time. The legal framework was developed in a very efficient way. It took some time, but this is due to the high priority the government gave the issue.
- I do not believe that the ownership rules constitute a barrier. This is simply the way the Chinese system works – other natural resources are only accessible for Chinese companies as well.
- The "49/51"-rule does not constitute a barrier for technology transfer. The HFC projects illustrate quite the contrary: the technology for HFC-23 decomposition was successfully transferred to China. Besides, foreign companies should not expect to be overly paid for their technology.
- The language barrier certainly is a barrier, but not a major one. This situation is improving fast.
- Concerning the cultural issues: companies do not fear to loose face. They fear to loose money, as everywhere on the world.

Interviewee:	**Markus Schwegler**
Title/Function:	Dr.
Institution:	Centre for Environmentally Sound Technology Transfer
Date and time:	30 March 2006, 15.00 h – 17.00 h
Place:	Café Kempi Daily, Lufthansa Center

Summary

General

- Major players within the government are not aware that the window of opportunity for the CDM is closing. If the average time to development of a project is taken into account, this year is the last opportunity to start projects, which are eligible in the first commitment period.
- There is very view strategic thinking. Chinese scholars and officials concentrate on tackling the existing barriers to the CDM.
- DNV organizes CDM-workshops for provincial officials. Although they cost quite an amount of money, they are always fully booked.
- Worldbank and China try to set up a Chinese DOE in a joint project.

Barriers

- The ownership of CERs is a major problem for implementation. The CDM Measures clarify that 51% of a project has to be held by the Chinese partner. Thus, a foreign company can never hold the majority of a project. This implies that the foreign company will not be able to own the CERs. As a consequence, foreign companies will not be willing to develop CDM projects themselves.
- The Chinese government has been very reluctant to create a legal basis for the CDM. In general, it has been sceptical towards the CDM. The government has just changed its attitude in recent years.

- In China, PDDs (or PINs) are published very late. This affects the learning process. Other project developers can just access the data very late and might thus end up with doing the same mistakes. This might be different in other countries, but this information has to be verified.
- Grid-data is lacking. But this data is crucial to start projects in the power sector.
- Language is a major problem. Many officials, who might even want to develop CDM projects, are not able to speak English. Even if PDDs are translated, problems accrue regularly if buyers of CERs (or other foreign project partners) have questions. In general, the process of communication is very slow.
- Most local and provincial officials do not know anything about the Kyoto-Regime. Capacity building is still needed. ODA should be used to intensify capacity building.
- Capacity is also lacking in foreign companies. They know very little on the specific Chinese situation. Again, language is a major barrier.

Interviewee:	**Wen Gang**
Title/Function:	Senior Program Officer, Ph.D.
Institution:	China GEF Office
Date and time:	April 7, 2006, 9.30 – 10.30 h
Place:	GEF Office, Debao Hotel, Building 22

Record (summary)

How is GEF involved in CDM development in China?

The China GEF office is a technical support body for the Ministry of Finance overseeing China GEF portfolio.

Regarding my personal background: before 2003, I have been a scientist at the Chinese Academy of Science, working on climate change and land cover and land use change. Then, I had the opportunity to join the China GEF office.

I have also been involved in the international climate change negotiations and been part of the official Chinese delegation to the COPs.

I have a very broad background – I think that is an advantage when thinking about the CDM.

Why does the CDM not meet its projected potential in China?

Currently, the full commercial business approach of CDM does not work very well. Though climate change issues are regarded a high priority in China, business sectors do not know very well how to link their business with and make money from climate change issues. What is more, enterprises are challenged by the very complicated international procedure. There are might also be language barriers, but they should be to overcome.

More important is to establish a basic understanding of climate change within companies as well as in the public. Then we could create a strong willingness. The public awareness might be rising, even within companies.

But the connection point is not clear. It is not enough to tell companies that they can get money through this mechanism. You also have to explain how to get it and how it is connected with climate change.

One of the major problems is simply that companies are not aware of the CDM and that they do not know how to develop CDM projects. A lot of work remains to be done in this field!

There are a lot of consultancy companies with strong influence. But such kind of influence cannot be seen positive all the time – the Chinese consulting market is still in an early stage. Some of the companies are not reliable. Often, they promise too much and lack the knowledge about risks. They are not able to assess existing risks the company takes. Consultancies rather focus on their own profits. At the end of the day, this means that transaction costs rise!

Could you please give me short outline of the CDM fund?

The Chinese government has always highlighted the ability of the CDM. This could be regarded as a kind of help to faciliate developed countries to fulfil their commitments under Kyoto-Protocol. I would also like to emphasis this first of all. This is not a pure commercial business. It is about climate change co-operation. The benefits will first be with the developed countries; the developing countries come second.

Developed countries can hardly fulfil their commitment under the Kyoto-Protocol because they face very high costs for CO2 mitigation. This is the basis for the CDM.

Developing countries will receive money through this mechanism in order to speed up their sustainable development. This will benefit global GHG emissions as well. Here, I would like to highlight that the Chinese government is very responsible towards additional receiving. It is better to have a balanced consideration how to support weak industries, in particular renewable energy and energy efficiency. The carbon market is important for developing countries.

The Chinese government gave approval to the HFC-23 projects. But from the beginning, the government though about how to green HFC-23 projects up. The Chinese government showed its responsibility towards sustainable development in aspect of the fees for HFC-23 projects.

The money will be used to support weak industries that can greatly contribute to environmental friendly development. This is the general purpose of the fund.

Currently we are defining how to operate the fund. We are thinking about setting up four main areas:

- Capacity building (including policies, institutions, research and etc.)
- Mitigation related development (renewable energies, energy efficiency)
- Adaptation related activities (not clear yet, because a comprehensive assessment of the impact of climate change on China is lacking)
- Public awareness (esp. education related)

GEF is not designing the fund, but we give some input based on GEF experience.

Why did China establish such a fund? It did not want all the money to be given to the companies. China will establish such a fund to support the countries' efforts to address climate change. We hope that this fund will never end so it can contribute to that process.

Who designs the fund?

The Ministry of Finance, NDRC, MOST, Ministry of Foreign Affairs and other ministries are working together to establish the fund. I am the team leader for drafting the basic framework of this fund.

About how much money do we talk?

At the early stage we do not have a lot of money in this fund. Just a few million dollars as an advance payment of the Worldbank..

The advance payment will come from HFC-23 emission reduction trading between the World Band and Chinese host enterprises. The Worldbank supports the fund because of its importance to China and the world.

For the first commitment period there has to be a lot of money in the fund.

We think that till the end of 2012 this fund can have a volume of about 1 billion US Dollars. This is a lot of money: but you will see that the developed countries have the big money, because they buy the CERs at a relative low price here, but the price in the market within the developed countries will be very high.

The government controls the price and wants it to remain relatively low.

Why? I do not think that is good for the national profits. If it is too low, enterprises will not have incentives to start projects.

If China does not sell CERs, developed countries will face greater challenges and costs for CO2 mitigation.

Do you think this fund is a model for other countries?

China is a very responsible country. China has it's own approaches to reach sustainable development and to address climate change. But I do not think China itself intends to transfer its models to other countries. They can develop their own ideas how to better use their money. Of course they can learn form the Chinese approach.

In Montreal, China advertised the fund as a model for other countries.

China wants to make clear what is our solution to green up HFC projects. China wanted to show that the fund is really meaningful for sustainable development.

What is the schedule for the establishment of the fund?

Currently, the progress is very positive. The internal consultation process is almost completed. The joint application for the establishment of the fund will soon be submitted to the State Council. It will not be presented in Bonn at the SBSTA meeting; that would be too early. But there will probably be a big launching event, a conference, in summer, if the State Council gives approval about the establishment of the fund. This conference will address all partners. But the four ministries want the State Council to give approval first – that will give the fund a greater significance. And it reflects that China takes climate change issues very serious.

Let us move to climate diplomacy. What do you think about a post-Kyoto-regime?

I do not have very deep thinking about these issues. Of course the establishment of the fund will have strong linkages with the future of the climate change cooperation. Maybe we can discuss that the government shall play a stronger role in a future

CDM-like co-operation mechanism. This is a very personal idea. I did not exchange such thinking with other colleagues. I think government be a good organizer to facilitate CDM project working.

During the climate negotiations, China has changed its attitude towards the CDM. Why is that?

I do not know details, but my personal understanding is that China had to consider climate change cooperation and national benefits. Every country does that. The Chinese position was based on national and international requirements.

At first, it seemed that the CDM projects couldn't provide enough technique transfer China needs for its development for addressing climate change. There was something missing for China. All developing countries were missing the additional financial and technique transfer promised in the UNFCCC. The importance of technological co-operation was highlighted at the G8 summit in Gleeneagles one more time.

But this time we are talking about money, not about technology. The mechanism was not good enough for China because China found that technique transfer could not realized with such a cooperation process. Then, China thought that the CDM might be a mechanism to support emerging markets. It was also considered a contribution to international climate change co-operation. Without China, the carbon market would not be working well, I personally think.

If you look at it from a global climate perspective, it is clear that China will have to reduce emissions e.g. in the energy sector. Much more technical support will be needed to achieve that.

Everything can be discussed at the negotiation table. We can also discuss a new design of the flexible mechanisms besides CDM. Personally I think that we should find more practical and efficient approaches. Currently, the procedure is too complicated; the government cannot play a stronger role. If the mechanism should become more efficient, the government would have to play a stronger role.

You said that everything could be discussed. What about a cap for China?

Developed countries spend too much effort to put pressure on China to take a commitment. Is that helpful? If you look at the 11th FYP, you will find that China highlights its responsibility towards climate change. Most important: China will see that every 5 years the emission reductions will be reduced by units GDP by 20 percent.

If China sets such domestic targets, it should be easy to accept a cap as well.

I am not a decision maker. I am just an expert. The answers from decision makers might be more significant. I do not have the ability to give a clear explanation.

Developed countries should a very practical way in terms of commitments of developing countries. Not only caps discussed in the Kyoto-Protocol are important. Domestic policies and strategies are more important! And do not forget that China is still a developing country.

China is in the process to work on climate change. This process might lead towards a commitment; but right now it is the beginning of this process, not the end! Besides, the issue of a cap should follow the principle of common but differentiated responsibilities. Developed countries have to move first to address global environmental problems.

Are you familiar with policy-based approaches to the CDM?

My personal understanding is that we should think about the feasibility first, based on the current development stage and current environmental conditions. Researchers in this light should explore such an approach. Is it feasible under a future regime?

In China, science is weak. Social science is weaker. The linkage between both is even weaker. China needs more think tanks like your foundation. In addition to that, most scientists working on this are based in Beijing.

Interviewee:	**Claudia Wink**
Title/Function:	Investment Manager Special Programs
Institution:	DEG – German Investment and Development Company
Date and time:	April 19, 2006, 10.00 h – 11.00 h
Place:	DEG Office, Sunflower Tower

Record (summary)

- The researchers of Tsinghua University have been among the first in China to work on the CDM.
- Although supporting climate projects is a priority of DEG, it is hard to find projects in China. The reason is that the private market is underdeveloped. There are a number of projects, but they are mostly run and owned by public or state owned enterprises. To support these projects is not within DEG's mandate.
- Know how has not only been lacking in Chinese companies, but also in German companies. Although big enterprises have obtained the required expertise, small companies still lack it.
- Together with partners, DEG has set up the "Kyoto Coaching Cologne" network to support German (and European) companies in CDM or JI related affairs.
- Foreign companies face a number of serious problems when entering the Chinese carbon market. On the one hand, the "49/51-rule" creates a major obstacle. On the other, the issue of ownership of CERs creates legal uncertainties for potential investors.
- Thus, foreign companies are very reluctant to enter the market. The existing CDM projects have mostly been set up by state-owned or public enterprises.

- There are a high number of new (Chinese) consultancies entering the market. For foreign investors it is hard assess which of them are reliable. Still, this is a positive development. It indicates that a new market develops.
- I do not think that the CDM in China is just facing “growing pains”. So far, no real market has emerged. The existing projects all rely on strong domestic or international support. Without these donors, most of the projects could not exist.
- If the framework for CDM projects is not going to be more favourable in the future, the number of projects will remain low.
- Sectoral approaches might be a promising option because companies face similar problems in the same sector. A consistent approach might be able to overcome these challenges. Still, general problems like legal uncertainties would remain.

Interviewees:	**Zhang Xiliang** and **Zhou Sheng**
Title/Function:	Professor (Zhang); Ph.D. (Zhou)
Institution:	Tsinghua University, Institute of Nuclear & New Energy (INET) Technology, Global Climate Change Institute (GCCI)
Date and time:	27 March 2006, 16.00 h – 17.10 h
Place:	Tsinghua University, Energy Science Building

Record

[*Short introduction of the study and the methodology*]

Have you participated in creating PDDs?

We have not been in the development of PDDs so far. But we are interested in that. I try to call another researcher, who works on that. He will be able to contribute to our discussion because he is in the specific PDD development.

Referring to the Worldbank (2004) study, the Chinese government should take a proactive approach. How did the government respond to that recommendation?

In China, the government's attitude is very positive. The government is very supportive to the CDM. China has a great potential, as well as India. But in India there are lots of CDM projects, whereas in China you will just find a very limited number. This is why the Chinese government included NDRC and MOST to push CDM projects.

Why is there just a limited number of projects?

There are various reasons. *First*, there have been no transparent and specific rules on the CDM development within Chinese government. The related policy was just issued last year. Before, the government did not know what is the benefit? Is it

feasible? And how to manage the project development? Just last year the interim measures were finalized.

Second, Chinese project developers are very serious. They want to ensure that the project it really works after approval by the UNFCCC. The related work is very serious. This is why just very view projects have been submitted.

Now, in this year, this could be changed. Many institutions came up with help to develop CDM projects and to write PDDs. Dr. Zhou will be able to give you an introduction. You can ask him specific questions and about the local increase of projects.

Do you expect the number of projects to increase?

Yes, certainly.

Why does the CDM currently not meet its huge potential in China – in particular not in the power sector?

I will give you an example. Last year, a Spanish electricity company reached agreement with the Huaneng Group to buy the CERs from three windfarms, two in the Jining province one in Hainan province. I was a member of the review group for the projects. It was a big project for China. Last year, they made an agreement. But next year and this year you will see much more agreements.

With the issuance of the legal basis, a very important barrier has been removed.

Why is it so difficult the reach an agreement? What is particular for China?

I think one important barrier is the missing local capacity. I will give you an example: just a very limited number of people will now about the CDM on the provincial level. Even the officials don't know about it. They have no idea! This is why we have a project on capacity building on CDM in China this year.

[*Zhou Sheng joins the discussion. Short introduction of the study and the methodology*]

Zhou: The most important barrier for CDM projects in the Chinese power sector is the lacking data for grid emissions you need for baseline calculation. But the Chinese government will work out this difficulty. Nevertheless, it is very difficult, because the grid data is not available.

Are there any efforts under way to change this?

Zhou: The various power and grid companies have kept the data confidential. So the data could not be summarized. But the government will handle this. The plan is to set up an emission factor for the grid.

One factor for the entire Chinese grid?

Zhou: Rather for each regional grid. Each regional area will have its own emission factor. But this data will not be available in soon time. You cannot just get the data. You need sufficient funding. On the other hand, the grid companies will not be happy to give the data away.

Why don't they want to provide the data?

Zhang: The grid co-operations are not very co-operative. But this problem is the same in Germany, is it not?

Constantin: Yes it is. The government had to pass a law to get the data from companies.

Zhang: But if you have the grid emission factor, the situation for CDM in the power sector will change significantly. I will give you an example: there is one grid company in Huaneng Group. They have a very good co-operation with the grid-company.

Zhou: there are just five power companies in China. In each grid area, each company has a power station.

Could a sectoral approach help to solve this problem?

Zhou: This could be a solution. But it will be difficult anyway.

The emission factor for the net will not be available soon?

Zhou: The emission factor will be provided, but I cannot account for the time. But the government has some measures to solve this problem.

This means we should not expect new CDM projects in the power sector in the very next time?

Zhou: Maybe we can use such data next year. But it is just a guess. Now, PDD developers cannot expect such data in soon time.

Zhang: According to the methodologies approved by the UNFCCC and for the development of CDM projects, the data in China is not adequate.

Zhou: There will be a meeting tomorrow morning on this. There is another problem at hand: All the approved methodologies have been developed abroad. They are not based on the Chinese situation. So all the approved methodologies have problems here. The conditions in China are quite different from those in other countries.

What are you going to do? Are you going to develop new methodologies for China?

Zhou: None of the methodologies has been developed in China. The funding is very poor; there is no professional experience. So we have to focus on changing the application of the methodologies. But to work this out bears some risks, the DOEs may not be able not approve such changes. So, a lot of projects might not be able to be accepted by the DOEs because of the design of the instrument. That is a big problem for Chinese projects.

A question about the application process: It is required for CDM projects to contribute to sustainable development. What does this mean in a Chinese context?

Zhou: For the CDM development in China it is just important to meet the environmental requirements. If the projects also have a benefit on the income of local employees, the projects contribute to sustainable development.

The revised version of the interim measures states, that 65 % of the revenues from CERs out of HFC and N2O projects shall be channelled into a fund. Is there any clarification on what this fund is about?

Zhou: The central government has set three the priorities: energy efficiency, renewable energies, and landfill gas (methane). The HFC is not among the government priorities.

But if you look at the number of CERs, the Chinese HFC projects already make up about 95 % of all CERs issued so far.

Zhou: A lot of foreign and Chinese companies are quite interested in these projects, simply because they generate many CERs. But in the whole of China there are just 12 such plants. The projects are just made for the money.

Zhang: About sustainable development: one specific criterion for this is technological change. This is why the Chinese government set the priorities in those areas. The CDM shall promote technology transfer to China.

So sustainable development is mainly about technology transfer?

Zhang: Yes, exactly. For the local governments environmental protection also plays an important role. But the technology investment is most important.

Tomorrow morning I will be invited to the Chinese government to discuss how the fund will be used.

Last November, at COP/MOP1 in Montreal, China advertised the fund as a model for other countries. But the big question is: What is going to happen to that money?

Zhang: It is still under discussion, there are different proposals.

Zhou: The government will support other CDM projects.

Who would be a good contact person to discuss this fund further?

Zhang: I am going to attend that meeting tomorrow. The Ministry of Finance is going to manage the fund. You should approach them. If I will receive interesting information at that meeting I will forward it to you.

I would like to move to another area. If you consider climate change globally, it is clear that China has to control its CO2 emissions, especially in the power sector. Do you think that the CDM as an adequate instrument for this task?

Zhang: Personally I think that the CDM is a very important instrument to promote renewable energies and energy efficiency. China became recently more interested in CO2 mitigation because the mitigation of CO2 is very much in the interest of Chinas sustainable development and energy security. And it is also about changing the pattern of development and growth! In China, there are two major targets in the new Five-Year-Plan: One is the GDP growth rate; the second is to increase energy intensity. This also means mitigation of CO2 emissions.

Is a policy-based approach to the CDM discussed in China?

Zhang: Energy efficiency CDM projects are rather small, when the size of the whole energy system is considered. We have the strong wish that the CDM gains momentum, because the potential is very big.

But the future of the CDM is very uncertain, especially when you consider the future of the climate regime.

Zhang: At the moment, the role of the CDM is only complementary. The CDM will not be able to solve all of China's problems in the power sector.

What other options will be important for the power sector?

Zhang: The energy efficiency law will be revised. There will also be an energy law next year, which is in the drafting process right now.

For the strategic perspective: The Chinese government has realized the importance of CDM and climate change issues. Just five years ago talking about climate change and the CDM was politically very sensitive. For the government in particular. But now, the government realized that in the very long future, we will have obligations to mitigate CO2 emissions. So now the government attached greater importance to the development of technologies and research on strategies. I will give you an example: the National Science Foundation in the past will not support that kind of study, the National Science Foundation would just spend its money to do basic research. The

same goes for the Ministry of Science and Technology, which has a spatial research programme to support climate change related issues.

Why did that change?

Zhang: A very important reason is that the mitigation of CO2 emissions is also in the interest of the Chinese long-term energy development strategy. This means energy security, diversified supply and energy efficiency to promote economic development. That is the basic interest.

Second comes the pressure of the international sphere. We are always the target!

I think the CDM has a very great future in China. But today, the role is still very limited. Many others share this view with me.

A last question on the design of the instrument itself. Do you expect changes for the CDM in the future climate regime?

Zhang: My personal view is that the CDM can provide countries like China with financial and technological benefits. China will also be interested in this in the future. China will be even more interested in technology transfer, in particular for CO2 mitigation.

Interviewee:	**Zou Ji**
Title/Function:	Ph.D., Professor
Institution:	School of Environment and Natural Resources, Dept. of Environmental Economics and Management, Renmin University of China
Date and time:	April 18, 2006, 14.15 h – 15.00 h
Place:	Renmin University of China

Record (Summary)

What options for low carbon development in China do you see in general?
There are three fundamental points.

1. *Energy efficiency*: Efficiency has to be increased in both production and consumption. Priority areas are the power sector, transport, and housing/construction. Energy intensive sectors (iron/steel, chemical production, cement/construction materials, metal production in general) offer a huge potential for energy savings and efficiency improvements; the average gap in efficiency between China and OECD countries is about 10%.

   I would also like to highlight the role of infrastructure sectors (power, transport and housing/construction). They are extremely important because of the lock-in effect: the infrastructure built today will determine the emissions of the coming two or three decades. The cost to change this situation will be very high. Thus, increasing energy efficiency should be taken very serious right now. The transport sector in the US can serve as a negative example for this.

   Manufacturing also plays an important role because of high-energy intensity. However, since product life cycles are shorter, you can change emissions easier than in the infrastructure sectors. Even if its carbon intensive today, technology transfer could change it within the next decade.

2. *Primary energy mix / fuel conversion*: the share of clean energies has to be increased in the energy mix. Coal dominates the Chinese energy mix; currently it is more than 70% of primary energy use. China plans to reduce the share of coal in the coming years. Coal is not only causing high carbon emissions, but also severe environmental pollution. If we could substitute coal with natural gas, renewables or even nuclear, we could expect lower emissions in the future.

   But there are limitations for this kind of structural adjustment: we would need to important oil or natural gas from Russia, the Middle East, Africa, and Latin America. But it is not safe for the Chinese economy to rely on international markets. As a consequence, we cannot expect a significant reduce of the share of coal. In 20 years, even in 40 years coal will continue to dominate Chinese energy production; i.e. its share will stay above 50%. However, there is space for some reduction.

   Hydropower is another option. 2009, after the completion of the 3-Gorges-Dam, hydropower will account for 1/5 of Chinese energy production. This way we will be able to reduce coal combustion.

3. *Carbon sinks*: we could increase sinks by forestry policies. China has ambitious plans to plant trees in north China. Not only as carbon sinks, but also to improve the local environmental situation (i.e. soil and water) and to preventing catastrophes (floodings).

Technological progress is another point. E.g. there has been progress regarding CCS technologies, but from my point of view research and development is still in a very early stage. But it should be developed on an international level.

Why are existing energy efficient technologies not deployed right now?

There are different barriers. The main ones are the most fundamental, although there are more:

First, awareness is lacking. Still, many people (both the general public and policy-makers) do not believe that climate change is a serious issue.

Second, there are institutional barriers. We need more and better environmental laws and regulations. Implementation also has to be strengthened.

Third, financial obstacles. Adequate funding is lacking, in particular in rural areas and cities outside Beijing.

Fourth, human resources are lacking. We need environmentally qualified managers, engineers and economists.

Which factors drive energy politics in China?

Climate change ranks last. It just receives greater attention because it is linked with other energy issues. The top policy priority is economic development. Because all kinds of development rely on energy supply, energy related issues are becoming important as well. This is the logic link; climate change refers to energy politics.

If climate change had nothing to do with economic growth, there would just be very little attention.

Chinese policy-makers agreed on ambitious objectives. But if you look at the implementation, you won't find much.

Yes, it is empty. I have a similar feeling. E.g. if you have a look at the laws for renewables or energy efficiency you will find the principles and the goals, but no budget, no responsible authority. These laws should rather be regarded as guidelines.

Should China accept a cap under a future climate regime?

This kind of discussion is naïve. China has set out goals to improve energy efficiency in the 11th FYP (20% from 2005 to 2010). This target has a great impact on Chinese carbon emissions. There are also plans to reduce local environmental pollution (sulphur, particulates, etc). This will also contribute to GHG reduction. Note that these are domestic actions! On the other hand, there is just very little political feasibility for a cap on international level – because it is a political game.

You also have to consider whether Annex I countries achieve their commitments under the Kyoto-Protocol. If not, the regime will loose credibility. Annex I countries will not be able to ask non Annex I countries to accept any kind of commitment.

How do you assess the prospects of a sectoral CDM for the future climate regime?

In terms of implementation and operation I do not see any problems for a sectoral CDM. It could reduce transaction costs. It could also be a way to reduce uncertainty for specific sectors.

But I have observed that the main concern is that a sectoral baseline might be changed to a binding national commitment. This is the key issue and the most serious political problem.

If you discuss the baseline problematic there is no difference between project-based and policy approaches. Both face the same options regarding reliability.

It would be necessary to identify sectors first; then we could identify problems and chances. It could also be an option to identify certain products, e.g. cars or cement. This would enable to get more solid results. Right no you are just discussing an abstract idea.

What about the power sector?

Probably the most serious issue would be to get reliable data.