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# The Power of Advice

## Experts in Chinese Climate Change Politics

Jost Wübbeke

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**Abstract**

This study examines the role of experts in China's climate change policy. With the beginning of the UNFCCC process, many semi-official institutes and universities emerged, dealing with the scientific, economic and political aspects of climate change. The major argument presented here is that experts are important actors in Chinese climate change politics, and that they have been underestimated in research on China. This analysis has two aims: first, applying a science–policy interface model from regime theory, it examines the political impact of various research organizations during different stages of the policy-making process. In the second step, analysis turns to the causes behind the degree of impact. These include the relevance of administrative links, the quality of knowledge, and personal ties. The results show that, in particular, semi-official institutes and certain universities can have a very high impact on political action.

**Key Words**

China, science-policy interface, experts, climate change

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# Preface

This report is based on my Master's thesis in International Relations at Free University Berlin, Humboldt University Berlin, and the University of Potsdam. I wish to thank my supervisor Miranda Schreurs for valuable and critical comments, and the insightful inputs from Steinar Andresen and Inga Fritzen Buan at the Fridtjof Nansen Institute (FNI). The FNI staff provided me with an excellent research environment, office space, and sponsored my research.

I am deeply indebted to the Research Centre for International Environmental Policy at Qinghua University (Beijing) for offering a platform from where I could organize my fieldwork in China from July to September 2010. The German Academic Exchange Service financed my research trip. The project benefited greatly from the friendly experts who shared valuable information with me in the interviews. Moreover, I had the chance to discuss my project with the participants of the 3rd PhD Workshop of the Environmental Policy Research Centre at Free University Berlin.

Special thanks go to my family for their continuous warm support. Without the help of my wife, preparing for the interviews in Chinese would not have been possible. I hope this research can contribute not only to advancing knowledge, but also to improving our perceptions of each other across cultural boundaries.

Lysaker, Norway
November 2010

Jost Wübbeke

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# Acronyms and Abbreviations

***Unless otherwise specified, all bodies and institutions listed here are located in China***

| | |
|---|---|
| CAF | Chinese Academy of Forestry (SFA) |
| CAAS | Chinese Academy of Agricultural Sciences (MoA) |
| CAS | Chinese Academy of Sciences |
| CASS | Chinese Academy of Social Sciences |
| CCICED | China Council for International Cooperation on Environment and Development |
| CMA | China Meteorological Administration |
| CRAES | Chinese Research Academy of Environmental Sciences (MoEP) |
| DRC | Development Research Centre |
| GHG | Greenhouse Gases |
| ERI | Energy Research Institute (NDRC) |
| MoA | Ministry of Agriculture |
| MoFA | Ministry of Foreign Affairs |
| MoST | Ministry of Science and Technology |
| NACCC | National Advisory Committee on Climate Change |
| NCC | National Climate Centre (CMA) |
| NDRC | National Development and Reform Commission |
| NLGCC | National Leading Group on Climate Change |
| PRCEE | Policy Research Centre for Environment and Economy |
| SFA | State Forestry Agency |
| UNFCCC | United Nations Framework Convention on Climate Change |

# 1 Introduction

Chinese climate-change experts frequently emphasize the precedence of political interests over scientific findings. They admit that international negotiations on emission reduction commitments long ago turned into a strategic 'game'. In such a situation, the advice provided by experts might serve as an argumentative 'weapon' at best, buttressing each nation's own position. This could apply not only in the Chinese context, but for any member state of United Nations Framework Convention on Climate Change (UNFCCC).

Western observers generally interpret the dominance of the National Development and Reform Commission (NDRC)[1] in China's domestic climate-change policy process as evidence of the supremacy of economic and energy interests over environmental and scientific concerns. When the Chinese Meteorological Administration (CMA) officially handed over policy leadership on climate change to the developmental agency in 1998, this marked a turning point, shifting control to the realm of politics. Chinese scientists, it is widely argued, carried weight only during the early years of agenda-setting prior to the UNFCCC in the early 1990s.

Although this is probably a fairly accurate depiction of China's climate change policy, a more differentiated and detailed examination of the current interaction between experts and policy-makers is called for. The complex nature of climate change and the limited knowledge of related bureaucracies require input of expert knowledge. As a consequence, basic science and policy research on climate change have grown rapidly in recent decade, and research centres have sprung up throughout the country. There is no evidence that the relationship between experts and the decision-makers has weakened over time: instead, the growth of research suggests an increasing role of expertise in policy-making. In addition to scientific research, the strategic nature of international negotiations has given rise to economic and policy experts. The variety of challenges inherent to climate change has promoted a multifaceted landscape of experts who provide recommendations from the viewpoints of science, economics, and policy. The argument put forward here holds that, even though politics overshadows science, expert advice is a crucial part of China's climate change policy today.

Western social science research has penetrated nearly every aspect of China's climate change policy, from the policy framework to international norms to implementation strategies. However, research on China's climate-change policy has generally not devoted much attention to the role of experts. The burgeoning literature on Chinese think-tanks is more aware of these new actors in Chinese politics, but it has concentrated mainly on foreign relations think-tanks. China's climate-change experts have not received systematic treatment in neither strand of literature. Those authors who occasionally touch upon the role of climate experts remain very vague, putting it into the footnotes rather than the main text.

Beginning nearly from scratch, this study seeks to promote a more systematic and deeper understanding of experts in China's climate change

policy. It begins by working out *how much impact Chinese research institutions have had in China's domestic climate-change policy process* (dependent variable). Adopting an impact model from regime theory, I try to *assess* the impact of experts. The second question concentrates on *what explains the degree of impact* (independent variables). Drawing on insights from Chinese think-tank research, I employ three variables: governmental linkages, the quality of expert knowledge, and personal relations.

The study takes on an actor-based perspective, comparing the impact of semi-official research institutes and some universities as the main units of analysis. The multidisciplinary character of climate-change research makes it necessary to investigate expert advice from both natural and social science disciplines – including meteorology, physics, agricultural sciences, geology, economics and political science. The inquiry is based on available data from scientific reports, information on the internet, and a host of interviews.

This study aims to increase our knowledge about the micro-processes of Chinese policy-making and to illuminate the specific role of experts. In this regard, I offer some pioneering work aimed at inciting further research on China's climate experts. Moreover, I hope to open China as a testing ground for various science theories.

The analysis is structured as follows (see Figure 1): the second part presents in succinct form China's participation in the UNFCCC process and introduces the major domestic research institutions. The third and fourth parts are devoted to developing the theoretical framework and assessing impacts. Guided by the question of what explains the level of impact, the third part examines the independent variables of impact.

**Figure 1: Structure of the study**

# 2 China at the Negotiation Table and China's Climate Experts

## 2.1 China in the UNFCCC and domestic efforts

The international community primarily coordinates international efforts on tackling climate change through the United Nation Framework Convention on Climate Change (UNFCCC), which entered into force in 1994. China joined the process early on, ratifying the convention in January 1993 (Chayes & Kim 1998). With the subsequent Kyoto Protocol, adopted in 1997 and effective since 2005, the member states for the first time agreed on binding greenhouse gas (GHG) emission targets for industrialized countries, setting the stipulations of the UNFCCC into practice. As a non-Annex I country, China did not have to commit to targets and entered the Protocol in early 2005 (UN 1998).

China has stressed two major national interests in negotiations: development and energy (Economy 1994: 137). China continuously has held the view that the developing countries should not have to accept binding commitments and that, according to the principle of 'common but differentiated responsibilities' enshrined in the UNFCCC, the industrialized countries should assume their historical responsibility. The developing countries, including China, should be allowed the right to development, without being constrained by mitigation efforts. Emissions rights should be determined on per capita basis concerning emissions and historically accumulated emissions. China has acted as a vocal member of the informal grouping G-77 plus China, which unites most of developing countries (Kasa et al. 2008; Lewis 2007: 155–174).

China's energy consumption, even with massive investments in renewable energies, is still dependent on fossil fuels, and will remain so (Hu et al. 2009:151, 795). With economic growth stimulating a strong appetite for energy, China gives more weight to energy-supply concerns than to environmental ones (Heggelund 2007: 162). In recent years, however, politicians have also become aware of the country's ecological vulnerability (ibid.: 167).

Initially, China took a rather hesitant approach in the 1990s, opposing a follow-up protocol under the UNFCCC and the proposed flexible mechanisms of the Kyoto Protocol (Chayes 1998: 523). As China is now the world's largest emitter of $CO_2$, the success of mitigation in China considerably determines the effectiveness of global efforts. Recent years have seen a more proactive climate-change policy. Although its opposition towards binding targets remains, China is more open to discussion, has accepted the 2°C threshold, and presented the goal of a $CO_2$ intensity reduction of 40–45% by 2020, in terms of 2005 levels *(People's Daily* 2009; Central Government 2009).

Whereas the industrialized countries pay particular attention to international commitments, Chinese experts and politicians see climate-change adaptation and mitigation more in domestic terms, with important actions taken at home. The $CO_2$ intensity targets announced previous to the Copenhagen summit are likely to be included in the next five-year plan in 2011. Chinese clean energy investments now are ahead of those of all other G-20 members (Pew Charitable Trusts 2010).

## 2.2 The domestic policy-making process[2]

The highest decision-making body as regards China's climate-change policy is the National Group on Climate Change (NLGCC 国家应对气候变化领导小组).[3] It is tasked with coordinating policy among involved government agencies, defining a common climate-change and low-carbon strategy, and representing the country's national position in the UNFCCC. The Chinese State Council, an equivalent to a cabinet, set up the leading group in 2007 as successor to a similar previous body. Prime Minister Wen Jiabao heads the group. A sign of the increasing attention of the state leadership towards climate change came when the NLGCC replaced the National Coordination Group on Climate Change in 2007, formally elevating the coordination mechanism to the highest

echelons of government.[4] The State Council had a stake in the previous group as well, but only now has it assumed firm leadership on the issue through the 'leading' group.

The National Development and Reform Commission (NDRC) manages the day-to-day business as the *de facto* leading agency (Central Government 2007a), responsible for organizing and coordinating domestic decision-making and international negotiations (Central Government 2008a).[5] If Wen Jiabao does not lead the Chinese delegation to the Conference of the Parties (COP), the supreme decision-making body of the UNFCCC, an NDRC vice minister assumes this responsibility.

The Ministry of Foreign Affairs (MoFA) is the second most powerful ministry in the NLGCC, with responsibility for supporting and leading the international negotiations within the UNFCCC framework. The MoFA, deeply concerned about China's developmental interests and national sovereignty, has been quite reserved towards internationally binding reduction targets, similar to the economic emphasis of the NDRC.

A total of 20 agencies are members of the leading group. Besides the NDRC and the MoFA, the most relevant are the Ministry of Science and Technology (MoST), the Chinese Meteorological Administration (CMA), the Ministry of Environmental Protection (MoEP),[6] and the Ministry of Finance (Central Government of P.R.C. 2007a). The CMA was the lead agency of the coordination group in the early 1990s, until it was officially replaced by the NDRC in 1998 (Harrington 2005: 111).

In a seminal work, Yu (2008) examined the specific decision-making mechanisms within the NLGCC, which he described as a process of internal consensus-finding. According to this architecture, the agencies communicate with and consult each other on specific topics after each agency has defined its internal position. Immediately before and during bargaining in the NLGCC, ministries seek to achieve a common agreement and arbitrate inter-organizational differences. If the bargaining is about international climate-change talks, they coordinate a common foreign policy strategy and reach a final consensus (Yu 2008: 19).

## 2.3 China's climate-change research

Deng Xiaoping pursued a less rigid top–down administration of scientific research than that of the Maoist era (Cao 2004: 29) and the new shift in state science plans benefited environmental research (Saich 1989: 21). But previous to the 1990s, little research in China focused on long-term climate change and the implications of human activities. Although China has an advanced meteorology discipline (Interview 9) and a good account of paleoclimatology, research lagged behind compared to European counterparts, who had systematically dealt with the causality between $CO^2$ and climate change ever since the late 1950s (see Revelle & Suess 1957). China made no noteworthy contributions to the early IPCC process (Economy 1994: 151). Slowly, Chinese scientists began research on climate change in the 1980s, but it was the political attention since the late 1980s that helped to boost research significantly (Tian 2000: 36). Economic and social perspectives have gained currency since the turn of

the millennium. However, Chinese basic science still suffers from several weak points. For instance, China has not yet developed a proper system for detecting and predicting long-term climate change, making it dependent on foreign models. Many of these insufficiencies still involve a considerable degree of uncertainty (Ding et al. 2007:4).

Initially, climate change science was a project mainly led by the government (Economy 1994: 180),[7] which still is a major driving force. As the country lacked in-depth research, Chinese experts and bureaucrats very early used international contacts and funding to improve their knowledge and expertise.

## 2.4 China's climate-change experts

Many semi-official institutes, universities, and civilian pundits from various academic disciplines are engaged in research on climate change, and their number is steadily rising. Zhu Xufeng (2006: 3–9) distinguishes three types of think-tanks: official research institutes embedded in the government structure, semi official think-tanks, and civilian think-tanks. According to this typology, official research institutes cannot count as think-tanks as they do not 'serve as an external brain'– by a Western definition, a main characteristic of a think-tank. Also semi-official think-tanks are affiliated to government bodies, receiving administrative funding and partly research funding from their sponsoring agency, but they are more free to choose what to research. Even if they do not completely fit into the pattern of a Western-style think-tank, this might be a typical setting for a Chinese think-tank (Zhu 2009: 337–338). Thirdly, civilian think-tanks, which include university-run research facilities and private experts organized in NGOs or enterprises, are even more independent (Zhu 2009: 339).[8]

Drawing on this typology, China's research institutions of climate change are classified as semi-governmental institutes and universities. Although this typology was developed for think-tanks, it is meaningful for research institutions as well. In the following, some key institutions of the two types are briefly presented (summarized in Table 1). For clarity, these will be grouped as (1) ministerial institutions, (2) institutions of the State Council, and (3) universities.

| | | **Basic Science** | **Impact and Adaptation** | **Mitigation** |
|---|---|---|---|---|
| **Semi-official institutes** | **Ministerial Research Institutes** | National Climate Centre | Chinese Academy of Agricultural Sciences; Chinese Research Centre for Environmental Sciences; Policy Research Centre; Chinese Academy of Forestry | Energy Research Institute |
| | **Institutes of the State Council** | Chinese Academy of Sciences | | Chinese Academy of Social Sciences; Development Research Centre |

| | | | |
|---|---|---|---|
| **Universities** | Beijing University | | Qinghua University<br>Renmin University |

**Table 1: Major research institutions in China, by type and research area**

This is a simplified description, as research is often interdisciplinary, crossing the boundaries of the three research categories.

### *2.4.1 Ministerial think-tanks*

Ministerial institutes were the first in China to conduct research on human-induced climate change. According to Chinese law, all these ministerial institutes are registered as 'public institutions' (事业单位), meaning that they have been established by the state a public purpose. They are legally non- governmental institutions (Central Government 2004). Among these institutes there is a rather clear division of labour, determined mainly by the organizational purpose of the governmental agency responsible.

To provide a deeper foundation for basic research on weather and climate, the Chinese Meteorological Agency (CMA) set up the *National Climate Centre* (NCC, 国家气候中心) in 1994 (NCC 2008). Corresponding to the responsibility of the CMA for the scientific assessment of climate change and development of scientific capacity (Yu 2008: 112), the National Climate Centre focuses on the scientific detection and attribution of climate change. Its work includes monitoring, developing a global climate model, and projecting future tendencies of global climate. The NCC created one of the two Chinese climate models that were adopted by the Fourth Assessment Report of the IPCC (Randall 2007: 597). Monitoring and reporting extreme weather events to the government are further important functions of the centre. Additionally, the NCC assists the CMA in representing China in the IPCC (NCC 2008).

The *Chinese Academy of Agricultural Sciences* (CAAS), subordinate to the Ministry of Agriculture, also participated in early work on climate change. Concerning the relationship between climate and agriculture, the institute's relevant research organs examine the GHG emissions from agricultural activities and the impact of climate change on agriculture, especially the implications for food production (Xiong & Lin 2006). CAAS experts explore the emissions-reduction potentials for agriculture. The academy's research on climate change extends also beyond agriculture towards a more general approach to questions of impact and adaptation (Interview 8).

The *Policy Research Centre for Environment and Economy* (PRCEE, 环境与经济政策研究中心) is one of two institutes under the leadership of the Ministry of the Environment. It conducts research on adaptation to climate change and the co-benefits of reducing other pollutants and $CO_2$ emissions (PRCEE 2005). The other institute, the *Chinese Research Academy of Environmental Sciences*, takes a broader perspective on the

impact of human activities on ecosystems, including climate change. In connection with the preparation of China's Second National Communication to the UNFCCC, the academy was involved in inventorying the release of GHG from waste treatment (CRAES 2008).

The *Chinese Academy of Forestry* (CAF) is under the purview of the State Forestry Administration. It focuses on the impact of climate change on forestry and adaptation, forest ecosystems in the carbon cycle and carbon sequestration, sustainable forestry and protection, and the carbon stock of harvested wood products (Bai et al. 2009).

In contrast to these five institutes, the NDRC's *Energy Research Institute* (ERI) is responsible for the economic dimensions of climate change and the energy sector. With regard to basic research, the ERI has developed a comprehensive scenario group for estimating the trajectories of China's future $CO_2$ emissions (Dai et al. 2009; Jiang et al. 2009: 35–88; Hu et al. 2009: 760–820). The institute also assists in developing strategies for national policies and international negotiations (Interview 3, ERI 2010). Early on, it provided expert support for international negotiations, becoming a scientific key player (Economy 1994: 176). In general, the ERI has taken a rather progressive position on energy technology at the domestic level. Among other activities, the ERI has recently been working on a report about the economic costs of mitigating climate change (Interview 3).

Also other ministerial institutes are engaged in research on climate change, although they feature in related research only occasionally. They include the Chinese Academy of Meteorological Sciences, which focuses on chemical processes in the atmosphere, the Water Resources Information Centre, and the Chinese Institute for Marine Affairs. The China Institute of Contemporary International Relations and the Chinese Institute for International Studies, both subordinate to the Foreign Ministry, have issued some publications involving an international relations perspective (Wang 2008).

### *2.4.2 Institutes of the State Council*

Four of the public institutions subordinated to the State Council (国务院直属事业单位) have research centres dedicated to climate change, each ranking equal to a ministry. The State Council appoints political leaders, often from scientific backgrounds, to serve as their heads. Two of these public institutions, the Chinese Academy of Sciences and the Chinese Meteorological Agency, are members of the National Leading Group on Climate Change (NLGCC) (Central Government 2007a).

The *Chinese Academy of Sciences* (中国科学院, CAS) is China's largest and most renowned academic institution in the field of natural sciences. Its major function is to take leadership in the nation's scholarly work (Yao 1989). Several institutes conduct research on climate change. The *Institute for Atmospheric Physics* analyses the basic physical and chemical processes of the earth's atmosphere. Similar to the NCC, the institute works on monitoring, attributing and predicting long-term climate change

(CAS 2010). It was CAS that designed the second Chinese climate model considered in the recent IPCC assessment report. The *Institute of Geographic Sciences and Natural Resources* conducts studies of China's historical climate (CAS 2009). Other institutes dealing with climate change are the Institute of Botany, the Institute of Policy and Management, and the CAS branch in Lanzhou.

The CAS's social science pendant, the *Chinese Academy of Social Sciences,* started research in 1997 when it set up the *Research Centre for Sustainable Development* (可持续发展研究中心). The work of the centre focuses on the economic implications of climate-change mitigation (Pan et al. 2003), on comparison of national negotiation strategies, international climate governance (Wang et al. 2009, Zhuang 2008), and determining global emission targets from the view of justice and developmental potential (Pan et al. 2009).

The *Chinese Meteorological Administration* (CMA) is the third relevant public institution under the State Council. Until 1994, it was a formal government institution, but abandoned this status when it was changed into a public institution (CMA 2009a). By definition, it is ranked on a level with CAS and CASS. Within the CMA organization, the *Science, Technology and Climate Change Department* (科技与气候变化司) is responsible for promoting technology and organizing research in the field of meteorology and the scientific basis of climate change. The department serves more as a 'science manager' than as an institution conducting research itself. For instance, it coordinates the application of Chinese experts for IPCC assessment reports (CMA 2009c; CMA 2010b). In line with its membership in the NLGCC, the CMA filters information provided by scientists, deciding whether to pass it on to the central or local governments (Interview 5). As such, the CMA itself will not be considered here as a research institution: instead, the closely related NCC will be subject to analysis.

The *Development Research Centre* (DRC) rarely participates in multidisciplinary research projects, directing most of its resources towards policy support. It started systematic research on climate change and low-carbon development only in 2008 (Interview 7). It has provided policy recommendations to the general low-carbon strategy (Zhang et al. 2009) and climate change (Zhou H. 2009), apparently of a more general nature.

A further public institution relevant to the field of climate change is the Chinese Academy of Engineering (CAE), with important experience of energy-efficient buildings. Such measures mainly concern the implementation of emission targets.

### *2.4.3 Universities*

University-based climate change research has expanded rapidly in the recent decade, but most universities are latecomers to the field. Especially visible are the Qinghua University,[9] Renmin University, Beijing University, Beijing Normal University, China Agricultural University, Nanjing

University, Tongji University and Lanzhou University (Qi & Ma 2007: 10).[10]

Qinghua University in Beijing occupies an outstanding position. It became involved in research very early and is presented here as an example. Its *Department of Environmental Science and Engineering* was founded in 1988 and has achieved a good reputation in this area. Currently, the department focuses mainly on technology transfer, mitigation proposals for various sectors of the economy, and the Clean Development Mechanism in China (Qinghua 2010a). Other relevant institutes at Qinghua University are the *Laboratory of Low Carbon Energy* and the *Energy System Analysis Laboratory*, which deal with low-carbon technology innovation, energy saving and carbon mitigation technologies (Qinghua 2010b). Experts from the Laboratory of Low Carbon Energy contribute to developing a roadmap of low-carbon development (see He & Zhang 2006), evaluating China's mitigation efforts, and projecting Chinese and international future $CO_2$ emission trajectories (He et al. 2010; He & Liu 2006).

#### *2.4.4 Other actors*

Experts from associations and civilian research institutions participate in climate change research and advice, but will not be considered here. Many science associations engage in the field, the more so as experts from semi-official think-tanks have often taken leading positions. Associations provide an effective platform to enhance intra-disciplinary communication among research institutions.[11] There are also various non-profit and profit research groups. The non-profit Chinese Economists 50 Forum, for instance, which includes the countries' most influential economists, came up with an innovative proposal toward a low-carbon society in 2009 (Fan 2009).

# 3 The Impact of Science

## 3.1 Science and politics

As a result of growing complexity inherent to the challenges of environmental problems, financial markets, and computing technology, expertise has become essential to society. Climate change confronts officials with the need to make decisions under high uncertainty, which they cannot cope with themselves. This knowledge gap in public administrations increases the demand for external inputs from expert communities that can conduct systematic research on the problems in question (Dessler & Parson 2006: 18).

From a traditional view, science adds greater rationality to political decisions by bringing in objective facts of reality to reinforce the validity of official decisions. The scientific practice is characterized by bringing objective truth from reality and into the normative realm of politics. Science is guided by the objectivity represented in the scientific method of verification or falsification of hypothetical statements (Hollis & Smith 1990: 50–57). It is a truth-seeking practice producing impartial and disinterested knowledge – whereas politics, as a system for settling common

decisions – is a sphere of strategic reasoning and values (Skodvin 2000: 27–29). The science theorist Robert Merton summarized this view of impartial science in what are now known as the 'Mertonian norms,' describing science as universal, a common resource, disinterested, and organized scepticism (Forsyth 2003: 57; Merton 1973).

The empiricist and positivist view of science has drawn criticism from scholars of science and technology.[12] Dismissing its dualist description of science and society, they argue that science, like any other part of society, is subject to the productive processes that construct reality (Latour 1999). Science in this view is not free from subjective perceptions and social processes (Chalmers 2001): indeed, they are more the rule than the exception.[13] In this perspective, science does not *necessarily* add more rationality to political decision. The combination of scientific facts and political values is no longer described as 'contamination', but subject to continuing work to negotiate the ever-shifting boundaries between science and politics (Gieryn 1995). Instead of a singular causality, scientific truths and social order are co-produced (Jasanoff 2004).

My analysis has a soft emphasis on the former. The aim of assessing the impact of scientific work *on* policy is based on the assumption of a fairly clear-cut separation between science and society. However, the study pays attention to the fact that experts regularly blend scientific facts with political norms and may even act as policy-makers themselves. Whether science increases the rationality of policy is a separate issue, not dealt with here.

## 3.2 Actors

Expertise can be studied in many ways. Various approaches define the unit of analysis as individuals, institutions, communities, and impersonal knowledge. Individual perspectives look at the activities of individual experts, assuming that knowledge and expertise are what they possess personally (Collins & Evans 2007: 1–10). In this regard, 'scientists' can be understood as individuals who hold a PhD in the natural sciences and are employed as such (Keller 2009:17).

Analysts who focus on research and policy institutions[14] emphasize the unity of a group of scientists or experts linked together through an institutional entity. In particular, the literature on think-tanks, one specific kind of institution, focuses on the activities of institutes engaged in active policy research. The Anglo-American tradition defines a think-tank as any 'organization undertaking policy-related, technical or scientific research and analysis', with the 'relative autonomy' varying according to cultural contexts (Stone 2005: 2; Stone & Garnett 1999: 3).

Community approaches argue that expertise is a relational and interpersonal phenomenon. Expertise belongs not to the individual but to the community or network of individuals. The epistemic community approach (Haas 1992) analyses the role of expert communities formed around shared beliefs in bringing about policy change. Similarly, the advocacy coalition approach (Sabatier & Jenkins-Smith 1993) extends its broader policy definition to experts.

Finally, discourse theories consider impersonal knowledge as a constitutive element of reality. The knowledge and power of discourses penetrate social relations and make sense of individual behaviour, with the self gaining meaning through these processes (Hall 2001). Expertise, then, is what is impersonally constructed through discourse.

The level adopted here focuses on *institutions* – active academic and policy advice institutions. This is a broader understanding of 'organization' than that usual in the think-tank literature, which at its broadest sees think-tanks as organizations being in interaction with the government over policy advice (Stone & Garnett 1999: 5). Here, I will use the term 'institutions' to refer to all societal institutions which treat systematic scientific, academic or policy research and can potentially take influence on policy. This comprehensive definition also includes natural science research of potential relevance to policy-makers, and social science institutions. Included in this definition are universities, even if their primary purpose is education and research. The actors are in the following termed 'research institutions'.[15] As defined in section 0, research institutions are distinguished as semi-official institutes and universities. In the following, the study will refer to 'experts' as the representatives of these institutions – natural scientists, social scientists and policy advisors. The term will refer to both a 'researcher' and an 'advisor'.

One analytical challenge is to include research institutions from natural science as well as social science backgrounds. Of course the impacts might differ, depending on the kind of information provided by an institution, but there is no point in making a distinction *ex ante*. To identify these differences is a task of the analysis itself.

## 3.3 The impact of expertise

A national policy on which experts exert influence will involve many aspects. The policy of determining a national position in international climate negotiations includes a wide area of domestic institutions, processes and structure. A national policy on climate change is composed of at least four aspects. First, policy-makers rely on specific interpretations and perceptions of reality. They have their own assumptions about the causality between human activities and global warming, or about the economic costs of impact and mitigation. Second, they have beliefs as to how tackling climate change is and should be linked to other social issues. Thirdly, a national policy involves decisions and strategies concerning mitigation efforts and international negotiations. Finally, the fourth aspect concerns the institutional design of the domestic decision-making process itself. A further aspect, which this study does not consider, is the implementation of decisions. Although climate-change policy has most importance at the domestic level in China, I will mainly look at the mitigation policy directed towards international negotiations – without, however, delving into the strategic interactions at international negotiations. Expertise can have a stake in all of the four aspects of policy mentioned above.

According to Zhu (2009: 336), experts can have impact on various spheres of society: on decision-makers, social elites, and the public. This

study examines the impact of expertise on the top decision-makers concerned with China's national climate-change policy. Various administrative levels and ministries are involved in this process, as can be seen from the NLGCC membership. Officials of branches (科), offices (处), departments (司), administrations (局), ministries (部), provinces (省), and the State Council are all potential destinations of impact. The analysis focuses on the impact on the Climate Change Department of NDRC, the minister-level of NDRC, and the State Council and the Politburo. Occasionally, the impact on the MoST and the CMA may also be considered.

## 3.4 Three stages of policy-making

Based on the multiple stages of the policy process (Lasswell 1956; Kingdon 1984), Keller (2009: 6) divides the policy process into three stages – agenda-setting, legislation, and implementation – in order to make clear the varying modes of science–politics interaction. Such a perspective is promising for examining the impact of Chinese experts, since agenda-setting, domestic decision-making, and implementation might allow for different impact levels.

The approach adopted here distinguishes three stages. In these terms, the *governmental agenda* is conceived of as 'the list of subjects or problems to which governmental officials, and people outside of government closely associated with those officials, are paying some serious attention at any given time' (Kingdon 1984). Agenda, as I will use the term, contains all those issues discussed for decision and alternatives which policy-makers are seriously considering. This comes close to the meaning of 'atmospheric' influence (James 2000: 163). Within these debates, political controversies may occur, but not necessarily. During agenda-setting, experts have the opportunity to raise awareness and incite debate about certain topics which politicians previously ignored or were not aware of.

There is a difference between the public agenda and the governmental one.[16] Whereas the public agenda concerns what the public and the media pay attention to, the governmental agenda refers to those issues which policy-makers actually take into consideration. This study focuses on the latter, even though, by shaping the public agenda, experts might also be able to place their ideas on the governmental agenda.

The second stage pertains to the congressional *legislation* or enactment in democracies (Polsby 1984). In the Chinese setting, a focus on the decision-making within the NLGCC seems reasonable, although it is less democratic and transparent. At this stage, the government, in interaction with other actors, makes authoritative and generally binding decisions. As described above, the NLGCC has assumed this task with regard to climate change. Before taking a decision, the NLGCC regularly hears the advice of experts through formal briefings, informal comments, reports or advisory committees.

The implementation phase manages the policy guidance following from a decision (Keller 2009: 7). The implementation of decisions will not be considered here: as the aim is to assess the impact of expertise on China's

international climate change strategy, we focus on China's activities in the *international negotiations* under the UNFCCC. Many experts participate regularly in the Chinese delegations to the Conference of the Parties (COP) of the UNFCC and related working meetings.

This rigid stage-approach has come under criticism for conceptualizing policy as a linear process and for only considering policy-makers (Sabatier & Jenkins-Smith 1993). Policy in this sense, as I conceive it, is a broader category that also involves journalists, experts, NGO activists, and civil society in general. In this regard, the 'stages' should rather be thought of as different 'spaces', which work in parallel or without any procedural chain. These 'spaces' are distinct platforms where policy-makers interact with other societal actors to define a common policy. These spaces then provide various modes of interaction between experts and politicians.

## 3.5 Level of impact

Based on regime theory, some international relations scholars have recently developed a theoretical device for categorizing the impact of expert advice (see Andresen et al. 2000 ; Skodvin 2000). They define impact – or an effective science–policy dialogue, as they term it – as the degree to which policy-makers accept scientific recommendations as valid and act upon them. Impact is reflected in consensual problem diagnosis and solution between experts and politicians (Skodvin 2000).[17] Their model distinguishes a three-level cumulative scale according to which policy-makers (1) recognize the *relevance and usefulness of science*, (2) accept *substantive conclusions of the scientific community*, and (3) make *science a guiding policy* (Underdal 2000a: 9).

At the first level, decision-makers see scientists as authorized speakers on the topic and accept the facts provided by the scientific community as a useful and relevant resource. If scientific advice reaches the next level of impact, politicians accept the validity of the *substantive conclusions* as determined by the standards of the scientific community itself. Thus, what emerges as scientific consensus or best knowledge is also accepted as such by decision-makers. Finally, at the level with highest impact of scientific research, when science becomes a *guiding policy*, politicians not only accept scientific facts, they also adopt the resultant policy implications of scientific conclusions (Underdal 2000a).

This study adopts the regime theoretical approach, with three minor modifications. Firstly, the model is not very explicit as to exactly how each of these levels can be grasped empirically. To measure the impact of expertise, the concepts of *access*, *validity* and *action* are introduced. *Access* denotes the ability of experts to enter the political sphere through more or less stable mechanisms of interaction. However, access does not necessarily entail that policy-makers accept expert information as valid statements. As defined by regime theorists, *validity* is seen as recognizing the substantive conclusions of scientific consensus. This does not necessarily entail that 'non-valid' statements are deemed wrong, but that some information is viewed as irrelevant. Finally, *action* occurs if policy-makers decide to act upon the recommendations so that the specific

scientific contents become visible in policy outcomes. Skodvin (2000: 15) suggests that '[a]s a minimum requirement then, a decision should, when implemented, represent some sort of behavioural change directed towards the resolution of the problem in question for a decision to qualify as "acting upon" scientific knowledge.'

These three forms of impact are designed in accordance with the three stage model of the regime theorists. At level one, experts have *access* to advisory mechanisms, but their advice has not been accepted as valid and is not acted upon. At the second level, experts gain access and their information is perceived as *valid*. Finally, at the stage of a guiding policy, the access and validity of expertise lead to political *action*.

To these three levels I add a lowest level 'zero', where experts have no impact at all. This does not necessarily mean that politicians refute their findings, but the experts can gain neither access nor validity.

The third modification concerns the empirical use of the model. In case studies employing the model, regime theorists have mostly spoken of science as a relative unitary actor embodied in advisory bodies to an international regime. But drawing on a pluralist understanding of scientific actors, this approach distinguishes the different political impacts of each of the research institutions involved.

Based on the conception presented in the previous two sections, the impact of experts will be classified on basis of the matrix set out in Table 2.

.

| | | I Participation | II Acceptance | III Action |
|---|---|---|---|---|
| **0** | **Not considered** | | | |
| **1** | **Recognize relevance and usefulness** | ● | | |
| **2** | **Substantive Conclusions** | ● | ● | |
| **3** | **Guiding Policy** | ● | ● | ● |

**Table 2: A model of expert impact on the policy process**

The X-axis shows the level of impact, the Y-axis indicates the various stages of the process.

The meanings of 'access', 'validity,' and 'action' vary, depending on the stage of the policy process. Whereas 'action' in the course of agenda-setting might concern a change of perception or interest, during domestic decision-making it would mean to taking up a recommendation for decision. The scale should not be understood as a rigid model on both

axes, as there are relatively fluid boundaries between all of these categories. To give an idea of how to identify the respective level empirically, Table 3 identifies major empirical indicators.

| | | I Agenda-Setting | II Domestic Decision-Making | III International Negotiations |
|---|---|---|---|---|
| **0** | **Not considered** | | | |
| **1** | **Recognize relevance and usefulness** | Research Projects<br>Presence in Media | Participation in all kind of communication to the government | Membership in Delegation |
| **2** | **Substantive Conclusions** | Government-sponsored Reports<br>Officials quoting expert findings | Membership of top-level advisory committees<br>Contribution to official documents | Experts giving advice |
| **3** | **Guiding Policy** | Change of Awareness of Leadership | Adaptation of specific proposals | Experts as Negotiators |

**Table 3: Empirical indicators for measuring impact**

## 3.6 Methodology

Three methodological aspects should be made clear. First, this study is conceptualized as a comparative study of several research institutes. Selection of cases was based largely on the visibility of the research institutions. However, the comparison is not a strict analytical model that pays equal attention to or examines all variables with regard to all institutions. As a loose guide, it identifies major differences in impact between types of institutions or individual institutions (Part 0) and seeks to explain these differences (Part 0).

Secondly, analysing expertise in China is a challenging task, because political structures and processes do not exhibit the transparency normal in Western democracies. The paucity of data on funding and specific advice should, however, not discourage research from analysing experts in autocracies – indeed, Western researchers should invest more time in this topic. Here, however, expectations as to getting complete data and making precise statements cannot be as high as in the case of democracies.

Thirdly, in order to generate in-depth data, I interviewed twelve experts from semi-official research institutes and universities in Beijing from July to September 2010. The interviews were designed as qualitative face-to-face interactions. Following a pragmatic reasoning, these interviews have the purpose of collecting data not otherwise available. A quantitative survey did not seem appropriate, as much of the basic information might not have been expressed in numerical values, missing important contexts.

Using a semi-structured structure (Hesse-Biber & Leavy 2006: 125), I started the interviews with fairly general questions, and then proceeded

with more structured questions later.[18] The set of questions was adjusted with each interview to fit the specific institutional and personal situation of each interviewee. This loose structure allowed me to insert occasional questions if the participant directed the talk in an unforeseen but useful direction (Berg 2003: 105). Interviews mostly revolved around the background of institutions and interaction with officials. I conducted all interviews personally in Chinese in order to retain the authentic language of the experts and to avoid omitting information due to language barriers.

# 4 The Impact of China's Climate Sciences

Even though expertise is commonly assumed to play a less important role in climate policy, I argue *that experts from various disciplines of the natural sciences and the social sciences have a significant impact on China's climate-change policy.*

Three indicators support this argument. First, the government has promoted the idea of 'scientific development,' putting new emphasis on sustainable and balanced development (CCP 2008). This approach accords to expertise an important role in boosting the rationality of public decision-making. The 'National Programme on Addressing Climate Change' (应对气候变化国家方案) of 2007 and the white book on 'China's Policies and Action on Addressing Climate Change', two major political documents on climate change, reflect this general emphasis (NDRC 2007: 28; Central Government 2008b).

Second, as mentioned above, the complexity of climate change and the limited knowledge and time of officials to understand its detailed nature make for greater demands for external knowledge from experts of various disciplines (Interview 3). This reflects a trend in many countries in recent years.

Third, to meet the demand for external knowledge, the supply of expertise has increased accordingly. As measured in terms of annual journal articles on climate change (see Figure 2), academic attention towards climate change, in particular in meteorology and agricultural sciences, has risen in China since the 1990s. Academic publications show a sharp rise from 2006, increasing eight-fold within the three years prior to the Copenhagen summit – the 'hockey-stick curve' of Chinese climate-change research. This trajectory is a result of the increasing relevance of economic research in particular (Interview 3) and environmental sciences (see Figure 3). The former already accounts for the largest share of absolute publications in 2009, probably reflecting the government's new emphasis on 'low-carbon economy'.[19] It can be argued that this increase is due to growing demand from policy-makers.

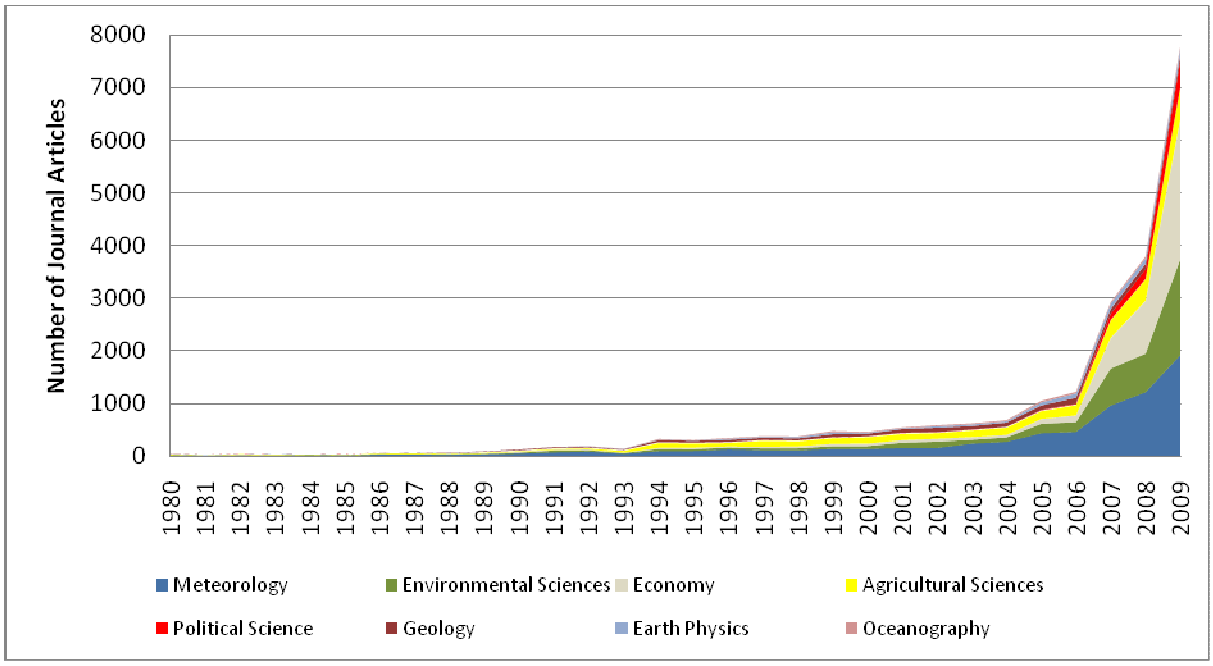


**Figure 2: Academic articles in Chinese journals on climate change, by discipline, 1980–2009**

(articles which include the keyword 'climate change'). Source: own research in the CNKI database (http://epub.cnki.net/grid2008/index/ZKCALD.htm).

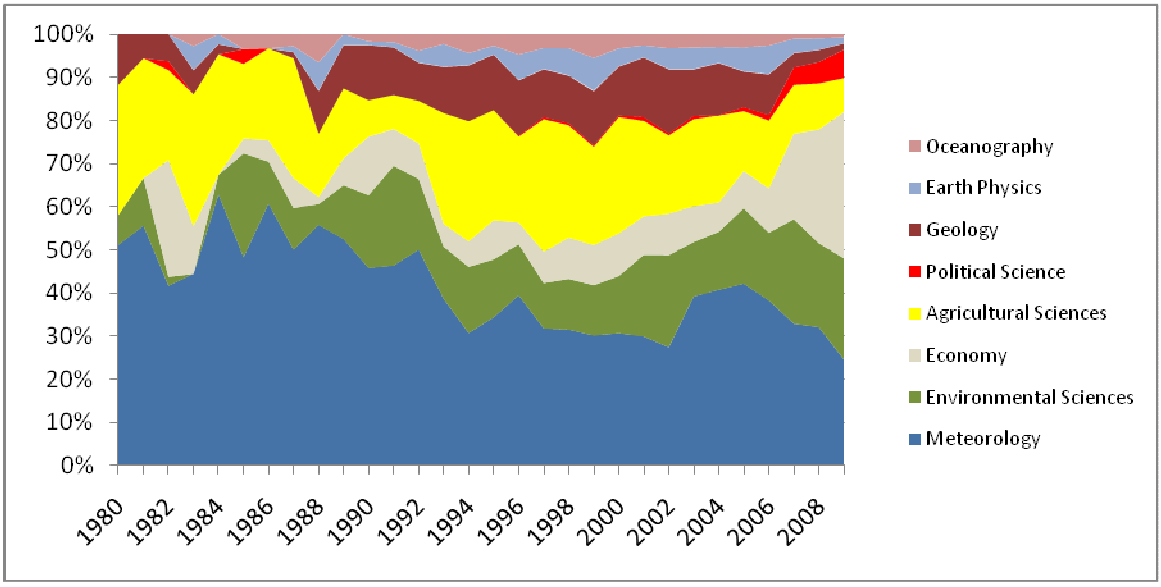


**Figure 3: Relative composition of academic articles in Chinese journals on climate change by discipline, 1980–2009**

Source: see Figure 2.

In the following section, this argument will be examined with regard to the three stages of science–policy interaction: agenda-setting, domestic decision-making, and international negotiations.

## 4.1 Agenda-setting

### *4.1.1 Access*

Domestic agenda-setting is open to a broad field of experts, who can contribute in three main ways: (1) participation in research projects, (2) participation in academic publications and conferences, and (3) media presence.

*Research projects*

The National Plan for Fundamental Research and Development, also called plan '973' and sponsored by the Ministry of Science and Technology (MoST), and the funds of the National Natural Science Foundation (国家自然科学基金委员会), constitute the most important financial sources for scientific research. The NDRC determines many research directions regarding climate change (Interview 1). The National Plan has set environment, energy and climate change as one of its research focus areas.[20] Research institutions can apply for projects within the plan's research framework (MoST 2010). Of all projects, 40% were conducted by semi-official research institutes and about 55% by universities (MoST 2009a: 65). More than half the projects on climate change and energy-saving technologies were led by the CAS in 2009, while less than half came from a wide range of universities (MoST 2009b).[21]

A similar distribution of research funds can be observed with regard to the National Natural Science Foundation (国家自然科学基金会). From 1990 to 2005, the CAS accounted for about one third of total project funds, with semi-official research institutes and universities accounting for slightly less than one-third each.[22]

Research reports or progress meetings with the sponsoring agency and other officials can be an important mechanism for reaching policy-makers (Interview 4). But only a limited number of researchers might actually meet with officials above the office level (处), not to mention contacts with officials of the Climate Change Department of the NDRC. Moreover, projects funded by the Natural Science Foundation are generally less of policy relevance than the 973-plan, which is more tailored to serve official needs (Interview 4).

One case of successful access to agenda-setting is the project 'Research on policies and important supporting technology against critical environmental issues' (重大环境问题对策与关键支撑技术研究) (Ding et al. 2009) under the '10th National Science and Technology Focus Plan'. The project group examined comprehensive explanations of the scientific basis, the impact and mitigation of climate change. From the outset, the project was conducted with political support and featured regular interaction with political counterparts. The MoST finally published the research results in the National Assessment Report on Climate Change (气候变化国家评估报告).

*Scientific articles and conferences*

Public conferences or academic publications can be another mechanism through which to communicate research results, especially for experts with limited access to policy-makers. At frequent more or less public conferences, researchers have the opportunity to present their research results to decision-makers. Using the platform of the marketized NDRC Training Centre, experts can offer training courses to officials (Interview 11). A few semi-official institutes even publish their own academic journals.[23]

It is unlikely that policy-makers take note of the entire mass of articles published in China's scientific journals. This kind of academic writing, if it is to get attention, depends on indirect transmission mechanisms or the work of intermediary knowledge-brokers,[24] who select, simplify and translate scientific information into a format comprehensible to policy-makers. The aforementioned National Assessment Report probably functions as one of those interfaces. Filtering out relevant information is also a major task of the CMA. Among its transmission tools is the journal *Advances in Climate Change Research* (气候变化研究进展), published by the NCC. Natural scientists, policy experts and top officials present research results in the journal, often in a simplified manner. NCC and CAS scientists write most of the articles in the journal, but CASS and ERI experts also contribute regularly. University-based researchers from Beijing University, Renmin University, Lanzhou University, Nanjing University, Nanjing University of Science Information and Technology and Tongji University also appear among the authors.

*Media*

Interviews and articles published in the media are another way to participate in the general climate debate. Policy-makers pay increasing attention to the voice of the media in newspaper and TV (Interview 4). They can continually retrieve information about media and research which the NCC sends to all relevant government agencies (Interview 5). The NCC even operates its own TV channel (影视集团，凤台) and has journalists in close contact with NCC research teams (Interview 4).

Visibility in state media, the Xinhua Press Agency and the People's Daily, might receive most attention. Both have mechanisms for collecting information from the public and passing it in internal press reports to the state leadership (Zhu 2009: 340, 341). Figure 4 shows that in particular researchers from CAS, Qinghua University, Beijing University, and the CASS have featured most in the news media of the Xinhua Agency. Ministerial research institutes account for slightly less, and other universities are only rarely on the news. This overview indicates that the media are a useful channel for some universities and semi-official institutes to gain attention. Besides Qinghua University and Beijing University, semi-official institutes dominate the media. According to one interviewee (Interview 4) the media might still be a way of attracting attention for other universities, even though they appear less often in the media.

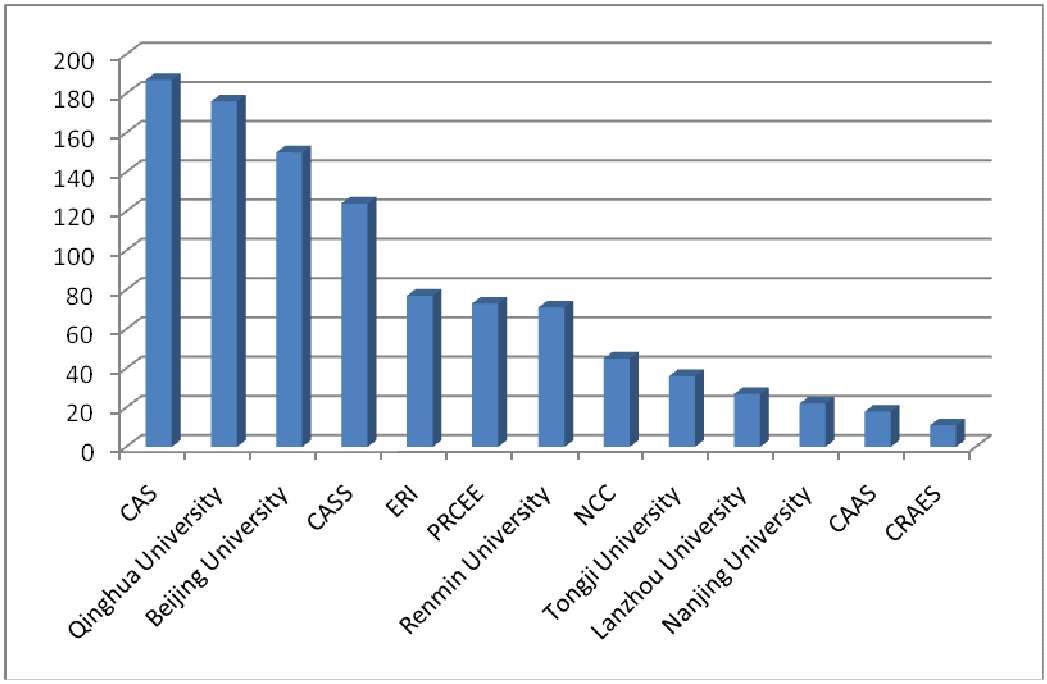


**Figure 4: Number of articles mentioning research institutions in connection with 'climate change' on xinhuanet.com in 2009**

*4.1.2 Validity*

Access to governmental agenda-setting enables some experts to wield influence on a higher level, where policy-makers deem their research findings as valid contributions. At this level, issues brought up by experts are seriously considered and the experts probably enter into regular interaction with policy-makers. Examples here include the National Assessment Report, the National Communication, emission scenarios, and international projects.

*National Assessment Report*

The National Climate Change Assessment Report (NAR, 气候变化国家评估报告) (MoST 2007) was the result of a huge research project under the National Science and Technology Focus Plan. The report was actually finished in 2005, but officially published in 2007 (Interview 5). The three working groups on the scientific basis, impact, and mitigation of climate change were led by the NCC, the CAAS and Qinghua University respectively. The fact that experts have compiled the research results into a National Assessment Report proves the validity which policy-makers attribute to their research. The editorial process of the report resembles that of the IPCC: After the experts had composed a draft, involved agencies could offer their suggestions (Interview 4), which 16 of them did (NAR 2007).

As the most comprehensive and complete elaboration of climate change in China, the report is intended to provide similar scientific authority domestically as the IPCC does at the international level (MoST 2007: i). It aims to provide a scientific background for deciding upon the strategy

of economic and societal long-term development, to support China in international climate change talks, and be a basis for future research (ibid.: ii). The National Programme on Addressing Climate Change (国家应对气候变化方案) mentions the NAR as an important scientific document highly relevant as a basis for making decisions, and incorporates many of the findings made in the NAR (NDRC 2007: 12).

Political support set the NAR apart from other research. From the same research project, the CMA published a report on the 'Evolution of China's climate and environment' (Qin 2005) with content similar to the scientific part of the NAR. But since policy-makers had not been involved in the editorial work, this purely scientific product received less political attention than the NAR, although the former was more influential among scientists (Interview 4).

A look at the institutional background of the 88 contributors reveals that the group of experts who issue valid statements is narrower than the group of experts who merely have access to agenda-setting. Mostly experts of the CAS, NCC, CAAS, Qinghua as well as smaller groups of researchers from the ERI and CASS have joined the NAR research group. Researchers from other universities or research institutes play only a secondary role (see Figure 5).

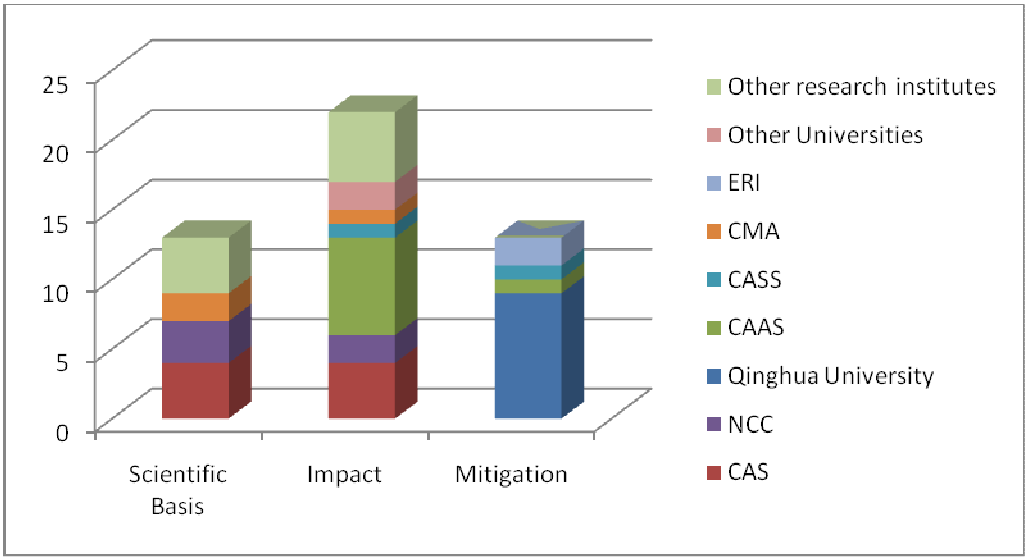


**Figure 5: Experts participating in the three parts of the national climate-change assessment report, by institution**

*National communication*

China prepared its first National Communication[25] in 2004 under the guidance of the NDRC. After being completed, the NCCC discussed and adopted the document, before the State Council gave its final approval. According to the Communication, about 400 experts from more than 100 government departments, social organizations, research institutes, universities, and enterprises contributed to the three-year project (Central Government 2004:10).

Scientific knowledge contributing to the National Communication enjoys considerable validity since the NDRC has selected the participating experts. The project enables experts to have a greater impact on agenda-setting, as it is politicians who coordinate the research. The progress meetings enable experts to communicate their ideas, at least to the deputy director of the NDRC Climate Change department. But as the Communication is mainly a political document (Interview 8), that might mean less room for experts to promote their own agendas than in the NAR.

Currently in the making with support of the UN Development Programme, China's Second National Communication is scheduled for 2012. The UN sponsors have pushed for enhanced expert input and broadened participation of social stakeholders (Central Government & UNDP 2007a: 4). Participation is indeed broader than with the initial Communication. The 'new' actors are businesses and associations, and other specialized or local institutes, like the China Building Materials Academy and the Beijing Disease Control and Prevention Centre. The sub-projects are also open to universities such as the China Agricultural University and Fudan University.

However, the same traditional institutions dominate in project work. The ERI and various institutes of the CAS, CAAS, and Qinghua University participate in several of the projects. They often take the scientific lead in sub-projects – for example, Qinghua University is responsible for 'China's inventory of GHG emissions from industrial processes' (CCCInfo-Net 2010e). The fact that the ERI is involved in eight of ten projects underlines its scientific leadership, in addition to the political leadership of the NDRC. On the other hand, although officials from the Ministry of Environmental Protection (MoEP) and the CMA are represented in all projects, there are few experts from the CRAES, PRCEE or the NCC among the contributors (see Table 4).

| Subproject Name | Participating Organizations |
|---|---|
| China's inventory of GHG emissions from industrial processes | Qinghua University, Beijing University, ERI, China Building Materials Academy, Ministry of Environmental Protection<br>Ministries: NDRC, MoEP, MoST, CMA, Ministry of Finance, National Bureau of Statistics |
| China's inventory of GHG emissions from the livestock sector | CAS, CAAS, China Agricultural University, ERI, Agricultural University of Inner Mongolia<br>Ministries: NDRC, MoEP, MoST, CMA, National Bureau of Statistics |
| China's inventory of GHG emissions from the energy sector | ERI, China Electricity Council, China Coal Information Institute, Qinghua University, Fudan University, China Automotive Technology and Research Centre, National Administrative Centre for Energy Saving, China Coal Transportation and Sales Society, China Cement Association<br>Ministries: NDRC, MoFA, MoEP, CMA, National Bureau of Statistics |
| China's inventory of GHG emissions from the croplands | CAS, CAAS, China Agricultural University<br>Ministries: NDRC, MoST, MoEP |
| China's inventory of GHG emissions from the land use change and forestry sector | CAS, CAF, CAAS<br>Ministries: NDRC, MoST, MoEP, SFA |
| China's GHG inventory database | ERI, Qinghua University, CAS, CAAS, CRAES, Beijing Zijiang Technology Corp. |

| | |
|---|---|
| | Ministries: NDRC, MoFA, MoEP, CMA, National Bureau of Statistics |
| China′s inventory of GHG emissions from wastewater and sewage treatment | CAS (IAP), CAAS, ERI, Beijing General Municipal Engineering Design Research Institute, Beijing University of Civil Engineering and Architecture, China National Environmental Monitoring Centre, Nanjing University of Science Information and Technology<br>Ministries: NDRC, MoEP, MoST, CMA |
| Assessment on impact of, vulnerability and adaptation to climate change | CAS, ERI, CAAS, China Oceanic Information Centre, Beijing Centre for Disease Control and Prevention<br>Ministries: NDRC, MoEP, MoST, Ministry of Water Resources, CMA |
| China's GHG Emission Forecast Methodology | ERI, CASS, CAS, CASS, Renmin University<br>Ministries: NDRC, MoFA, MoEP, CMA, National Bureau of Statistics |
| Improving Public awareness and informing policy decision-making on climate change | ERI, CEInet Data<br>Ministries: NDRC, MoEP, MoST, CMA |

**Table 4: Research institutions and governmental agencies participating in progress seminars of the preparation work for China's Second National Communication, as of 2010**

Source: CCC-Infonet2010a-i.

*$CO_2$ emission scenarios*

A third case of valid research concerns the emission scenarios developed by the ERI. Recent research has put forward three different scenarios for future GHG emissions in China. Of the three, the Enhanced Low Carbon Scenario (ELC) operates with the most progressive measures towards a low-carbon society. According to the ELC, total $CO_2$ emissions in 2050 would be slightly below the 2005 figure. The other two scenarios predict an increase in these emissions by 68% and 135% respectively (Dai et al. 2009: 75).

The ERI is now pushing for the ELC scenario to be adopted as a guide for policy. The scenario, which other experts increasingly use, has in fact become a common ground for discussing China's future emissions. It has also been adopted by a recent report of the China Council for International Cooperation on Environment and Development (CCICED 2009: 11–15). There is now *de facto* scientific consensus about the future roadmap of Chinese GHG emissions, despite some dissent about the costs of mitigation. The relevant ministries to which the ERI presented these research results have not yet come with a definite reaction, but experts are optimistic that the politicians will follow the scientific consensus (Interview 3). The case of the ERI scenarios indicates how a scientific consensus is likely to be accepted as valid, resulting in a shift in perceptions.

*International cooperation*

Also the China UN Development Report 2009/10 (UNDP 2010) has been making 'valid statements'. The report was prepared under the coordination of Renmin University and supported by the UNDP. Such cooperation involving domestic researchers with foreign research institutions or international organizations is very likely to come to the attention of the leadership. As in the case of the development report, high-ranking politicians have made frequent reference to the report, not least with regard to its explanations about technology and capacity.[26]

*4.1.3 Action*

Valid expertise can initiate a change of perception or even a redefinition of the national interest. Expertise as a guiding force of the governmental agenda might not be the norm, but at least two points show a significant impact: vulnerability and uncertainty.

*Vulnerability*

Over the past decade, Chinese scientists have devoted increasing efforts to assessing the country's local and national vulnerability to climate change, especially its water resources, agriculture, terrestrial ecosystem and coastal zones (NDRC 2004:49). It has become widely acknowledged among Chinese experts that China, more than many other countries, is highly susceptible to climate change, with some impacts already evident. According to the National Assessment Report (NAR), surface tempera-

tures in China have been rising by about 0.5 to 0.8°C during the last 100 years (MoST 2006: 14). Moreover, scientists connect the increasing frequency and intensity of droughts in the north and flooding in the south with climate change (Zhai et al. 2009). Experts have expressed concern about possible future impacts, with more extreme weather events, changing precipitation patterns, higher temperatures and rising sea levels. More recently, climate change has even been assessed as a potential threat to national security (Zhang 2010).

There are signs that the scientific consensus has already spilled over to the political domain. It can be argued that even the scientific-political interaction of the NAR has triggered a new understanding, drawing the attention of decision-makers towards China's vulnerability as a threat to its national interests (Heggelund & Andresen 2010). Although this report did not directly change behaviour in the sense that policy-makers came up with a new policy, it made the leadership recognize vulnerability and spurred a new debate about vulnerability, in a way inconceivable earlier (Interviews 1, 4 and 6). To put it in a nutshell, Chinese experts have succeeded in defining a new national interest: policy-makers are increasingly aware of vulnerability, in addition to energy and development.

Reflecting this reasoning, the National Programme on Addressing Climate Change recognizes that 'climate change already had a certain impact on China…and will have severe impact on Chinese ecosystems and socio-economic system in the future' (NDRC 2007: 4–5).[27] Similarly, the White Paper on China's Policies and Action for Addressing Climate Change (NDRC 2008) stated that China is 'most susceptible to the adverse effects of climate change'. In contrast, China's first National Communication simply spoke of climate-change impact as 'change', without mentioning any adverse consequences (NDRC 2004).

*Uncertainty*

Scientific uncertainty about the origins and impact of climate change confronts policy-making with the challenge of reaching decisions under conditions of limited knowledge. At the outset of the UNFCCC, China openly employed the 'uncertainty' argument to strengthen its hesitant position against overly far-reaching efforts. One delegation member was quoted as saying: 'governments could not base policy decision on such scientific uncertainties' (Chayes & Kin 1998: 524).

Although many recent political documents mention uncertainty, a statement by Xie Zhenhua, Vice-Chair of the NDRC and delegation leader of the Chinese delegation to COP meetings, has clarified the changed attitude of the government towards uncertainty as follows: 'Even if there is still a fierce controversy about the origins of climate change among experts and many scientific uncertainties exist, nobody would dare to put the life of our planet on the line or the future of humanity at stake' (Xie 2010). The Chinese officials now accept the findings of the IPCC reports as valid scientific resources and agree with the assumption of human-induced climate change. The National Programme notes that 'the global warming of the last 50 years is mainly caused by the greenhouse effect resulting from huge emissions of GHGs by human activities' (NDRC

2007: 4). This political statement is even less tentative than the NAR, which has expressed considerably more uncertainty: 'The climate change after 1950, particularly since the last 20 years, is probably mainly related to the increase of GHG concentration in the atmosphere caused by human activities, but might also be a result of the increase of shortwave solar radiation in the last 20 years' (NAR: 102). According to involved experts, explaining the uncertainty to policy-makers was one of the most difficult tasks of the NAR (Interview 4). But there is optimism that the next IPCC report and the second NAR, to be published in late 2010, can decrease this uncertainty (Interview 5).

China's positive attitude towards uncertainty is certainly an achievement of its scientists. They have played an important role in explaining to policy-makers that scenarios entail considerable uncertainty, but that, even if many may doubt their findings, these are the only available methods for projecting climate change and should be trusted (Interview 5).

Remarkably, a few Chinese scientists have heavily denounced the findings of the IPCC. Arguing that the global warming and its anthropogenic origin are far less certain than indicated in the IPCC assessment reports, they also point to several methodological and data flaws in the report (Wang & Ge 2009). Some even totally reject that view that human activities have had an effect, and predict a cooling period for the decades ahead (CCC-Infonet 2010j). However, it appears that these sceptics have remained rather unheard in the domestic debate. The government seems to stick to the scientific consensus, even if it would serve its domestic interests to more emphasize uncertainty. Experts probably had a great deal to say in convincing policy-makers that, although the uncertainty is considerable, that cannot be an excuse for inactivity.

However, though uncertainty is not a general paradigm for inaction, it might serve as a defensive weapon of last resort, as two mainstream scientists have indicated: '…When negotiations are in the active phase, we must not use this weapon; only if developed nations increase the pressure on developing nations to accept binding emission commitments, then we should emphasize uncertainty. We should in particular analyse, research, and summarize the uncertainty inherent to basic science and occasionally be prepared to provide an exact and refined defense weapon for negotiations' (Dai & Ren 2003: 95).

#### *4.1.4 Summary*

Access to agenda-setting is widespread. Many universities and research institutes participate in research projects, publish academic articles, and feature in the media. However, few of them, mostly semi-official institutes and a few universities, issue valid recommendations. CAS, NCC and CAAS hold a leading position with regard to the scientific agenda, while ERI, CASS, Qinghua University, Beijing University and Renmin University are leading on the policy side – these could be called the 'traditional institutions'. These traditional institutions have the possibility, through contributing to the NAR and the National Communication, to shape the domestic agenda considerably as regards the issues of vulnerability and uncertainty. Some tendencies hint at increasing participation of universities, and many former ERI research topics are now the responsibility of CASS and Qinghua University (Interview 3).

## 4.2 National decision-making

### *4.2.1 Access*

Generally open to all kinds of expert input, the policy process mainly allows access through written statements or internal meetings. Reports and meetings are a frequent form of interaction. Besides day-to-day business, reports to the NDRC or even the State Council and the Politburo are very powerful mechanisms. Before reaching a decision, the NLGCC will often invite experts to present their advice on a particular issue (Interview 1). Some of these reports are publicly available. On the other hand, certain recommendations are kept confidential or published only later. Especially as regards the semi-official research institutes, reports to the government are a daily routine. But these mechanisms are sometimes open to many experts, also those favouring strategies that deviate from the official position.

One example is Hu Angang, director of the China Centre at Qinghua University, who provides advice to the government on current economic, security and environmental challenges, but is not involved in active climate change research at the university. Recently, however, Hu attracted attention when he publicly claimed that China should accept international binding targets (Hu & Guan 2008). Hu and Guan wrote (2008: 151) that 'China's leaders should use the window of opportunity at the Copenhagen summit to make commitments as quickly as possible about China's emission reduction, proclaim a Chinese reduction roadmap, secure the success of the reduction agreement, and turn into one of the leaders of global climate governance.' Moreover, Hu used the 'China Reports' (国情报告), regularly published by his centre, to promote his perspective.

Hu is one of the most influential government advisors with close contacts to the party leadership and the State Council, often reporting to the leaders. One of his reports on enhancing domestic forestation as a method of mitigating climate change received considerable attention by the leadership (Hu 2009).[28] All the 'China Reports,' moreover, are likely to reach the attention of the state leadership (Yuan 2010). Although Hu can access the leadership with these ideas and has probably also written internal reports on the international climate change strategy, it can be assumed that these recommendations are not seen as 'valid information': at least, policy does not seem to have considered moving in that direction. On the other hand, however, his recommendations are seriously heard.

Another case of non-traditional actors getting access to decision-makers is that of two authors from a business corporation and the relatively unknown Nanhua University. After the two had published a scientific article on new perspectives on climate change (Jiang & Tang 2008), they wrote a proposal to the NDRC Climate Change office with some specific suggestions. Despite their promoting a non-mainstream perspective, they reported that the head of the NDRC Climate Change Department later gave them feedback personally (Jiang 2009).

As regards regular access in decision-making, where experts are in regular interaction with policy-makers, the group is much smaller. As an instance, ERI researchers meet with officials of the NDR Climate Change Department several times a month and regularly report their research

results to the office. The ERI has also reported to the State Council several times (Interview 3), as have researchers from CAAS, CASS, NCC, and Qinghua. These institutions receive most invitations for workshops and meetings of the National Leading Group, though they might not be invited to all (Interview 1). In particular the ERI, CASS and Qinghua University have close ties to the NDRC (Interview 4).

#### *4.2.2 Validity*

The group of experts making what are seen as valid recommendations to decision-makers is even smaller than those with regular access. It can be argued that the members of the National Advisory Committee on Climate Change (NACCC, 气候变化专家委员会), the China Council for International Cooperation on Environment and Development, and contributors to official documents are the most authoritative experts who speak about climate change and enjoy validity and high attention by top decision-makers.

*The National Advisory Committee on Climate Change*

The NACCC was set up in 2007 under the National Leading Group in order to provide advice on important issues, but had existed informally since 2005 (Interview 5). The committee's office is located at the Department of Technological Development of the CMA, whose head is also head of the office (CMA 2007). As of 2007 it had 12 members. The new NACCC not only underlines the new importance of expertise: it also coincided with the creation of expert committees in other areas.[29] Following similar tendencies in the industrial countries (You 2007), the Chinese studied foreign advisory committees like the German Advisory Council on Global Change in designing the NACCC (Interview 9).

The committee covers the scientific and policy support for major issues in Chinese climate policy, including policy proposals and the formulation of national strategies. It was actively involved in devising a strategy for the Copenhagen summit in 2009. Policy-makers will always consult these experts before making critical decisions (Interview 5). According to the NACCC head, Sun Honglie, 'our work is to unite all kind of experts from the scientific sphere, gather the knowledge of everybody, and to make policy proposals for China's climate change efforts on the basis of scientific inquiry' (in Tang 2010). Or, more frankly put: 'to deliver ammunition to the people sitting at the negotiation table' (Zhou Y. 2009).

Its topics are (1) technical advice about climate change and GHG reductions, (2) scientific support for international negotiations, (3) climate change-related disaster prevention and relief, and (4) international cooperation (CMA 2009b). The CMA views this as a great step to promote the expertise and democratization of climate change policy (Wang 2007). Research within the NACCC is organized around different 'issue groups' (专题组). Most its research projects are of very short duration – six months and up to one year. On the one hand these reports are requested by the government; on the other hand, the expert group has many projects determined by the members themselves. On the initiative of the experts, the committee set up an issue group to analyse and interpret the implications of the fourth IPCC Assessment Report for government

policy (CCC-Infonet 2007a). In early 2008, the NACCC delivered a confidential report presenting the results to the government.

The NACCC has its own communication mechanism for sending reports and opinions directly to the State Council and the NDRC, and writes several reports a year (Zhou Y. 2009). In addition to frequent workshops (Interview 1), the committee meets at least once a year with premier Wen Jiabao and top officials of the NLGCC, presenting the annual work report. The week before leaving for the Copenhagen summit, Wen Jiabao convoked the expert committee a final time (Interview 5).

The NACCC is a two-track body with both natural scientists and policy experts, enabling it to respond to all questions related to climate change. The most influential research institutions are represented on the committee (Interview 5), including the ERI, CAAS, CASS, CAS, NCC, the Chinese Academy of Forestry (CAF), and Qinghua University. Its head, Sun Honglie, is a retired resources and soil geographer, who served as deputy head of the CAS. He has been promoting research on resources and environmental protection in China, having outstanding and path-breaking academic merits in this field (Sun 2005). Also among the members are the three lead authors of the three parts of the NAR, of whom two serve as vice-heads. In addition to the membership of traditional institutions (Table 5), other semi-official research institutes like the Chinese Academy of Building have joined the group, providing support in energy efficiency in buildings and air conditioning.

| Researcher | Year of Birth | Institution | Academic field |
|---|---|---|---|
| **Sun Honglie (head)** | 1932 | CAS (officially retired) | Resource and soil geography |
| **Ding Yihui** | 1938 | NCC (officially retired) | Physical Science/Meteorology |
| **He Jiankun** | 1945 | Qinghua University | Economics |
| **Lin Erda** | 1947 | CAAS | Agro-meteorology |
| **Zhou Dadi** | 1946 | ERI | Environmental Engineering |
| **Pan Jiahua** | 1960 (?) | CASS | Economics |
| **Wu Guoxiong** | 1950 (?) | CAS | Meteorology |
| **Jiang Youxu** | 1938 (?) | CAF (officially retired) | Ecology and Geobotany |
| **Li Lierong** | 1942 | Three Gorges Reservoir Geological Disaster Prevention Leading Group | Geography and engineering |
| **Lang Siwei** | 1947 (?) | Chinese Academy of Building | Engineering |
| **Chao Jiping** | 1932 | CAS (officially retired) | Meteorology |
| **Yi Gai** | ? | Ministry of Environmental Protection | ? |

**Table 5: Members of the National Climate Change Advisory Committee in 2007**

Source: (CMA 2007).[30]

In September 2010, the government selected the members for the second term of the NACCC. Thirty-one experts now sit on the committee. The academic backgrounds of the current members cover the academic disci-

plines of climate change science, economics, ecology, forest science, agricultural science, energy, geology, transport, building, and international relations (Su 2010).

*China Council for International Cooperation on Environment and Development*

Another high-level advisory body with institutionalized access to the highest leadership is the China Council for International Cooperation on Environment and Development (中国环境与发展国际合作委员会). Set up in 1992 with the approval of the government, it provides advice to the Chinese leadership on important environmental and developmental issues (CCICED 2008a, b). By its very design, the council is an international body involving foreign politicians and renowned experts, such as IPCC head Rajendra Pachauri, and Chinese experts. Vice Premier Li Keqiang chairs the council, with NDRC deputy minister Xie Zhenhua vice-chair. As the political-scientific mixture of this council endows Chinese experts with a powerful channel for accessing the leadership, it can be argued that only highly trusted experts deemed as authorized speakers can be members. Of the researchers dealing with climate change and low-carbon society, we find Ding Zhongli (CAS), Zhou Dadi (ERI), Liu Shijin (DRC), and Ding Yihui (NCC) on the CCICED.[31]

The council has established a task-force group to study low-carbon development. Its results have been published in the report on 'China's Pathways Towards a Low Carbon Economy' (CCICED 2009), with recommendations on implementing a domestic taxing system, market measures, regulations and urban planning (ibid.: 27–34). Many researchers who do not sit on the CCICED have joined the task force, mainly from the ERI, CASS, PRCEE and the Development Research Centre (DRC) as well as Hu Angang. CCICED membership and participation in its research projects show that the same traditional institutions use this mechanism. It might be particularly important for the DRC, which has no expert member on the NACCC.

*Contribution to official documents*

A third example of experts issuing what are deemed 'valid statements' during decision-making is their contribution to official documents. Many experts have been involved in drafting the National Programme on Addressing Climate Change. Normally, when planning an official document, the NDRC sets up a working group of policy-makers and experts. The experts then create a draft and the working group meets once or twice a month for detailed discussions on the wording and data (Interview 3). At least experts of the ERI, the CASS, the CAAS and the NACCC have supported writing the National Programme on Addressing Climate Change.[32] In addition, experts make important contributions to the Five-Year Plans, and are currently collaborating in preparing the 12th Five-Year Plan.

*Experts as policy-makers*

Some experts, while serving in their research institutions, are also members of political organizations. For example, NACCC head Sun Honglie is member of the National People's Congress, according to the Constitution the highest body of the government. Some experts are members in the Consultative Conference and its Population, Resources and Environment Committee (人口资源环境委员会). Through this channel, they also have the opportunity to deliver proposals with regard to environmental concerns. According to one member, they have already delivered about ten proposals regarding environment and climate change, some of which have been adopted by the respective legislative organs (Interview 1).

### *4.2.3 Action*

It can be assumed that much of the research and advice provided by experts through the NACCC or the CCICED is adopted and put into action by the government. Two important examples are the '40 to 45 degree' goal and the proposal for the creation of the NACCC itself.

*The '40 to 45 degree' target*

As a voluntary action, the State Council proclaimed in November 2009 that it would aim to reduce $CO_2$ emission-intensity per unit of GDP by 40 to 45% by the year 2020 (as compared to 2005 levels) and released a detailed task plan for implementation. China presented this as the domestic goal of achieving a low-carbon economy, but it was equally an offer addressed to international society in conjunction with the post-Kyoto negotiations (State Council 2009).

It was actually the NACCC that proposed the '40 to 45%' goal to the State Council (Interview 1). The NACCC experts discussed specific $CO_2$ intensity targets for several months, calculating the possible mitigation potentials year by year. After long discussion they came up with the '40 to 45%' proposal. This the government immediately adopted, setting specific reduction plans for each sector (Interview 5). While there were probably many different perspectives on how much to reduce $CO_2$ intensity, the '40 to 45%' goal presumably came from the research team around the Low Carbon Laboratory at Qinghua University (Interview 2). The team had been researching future $CO_2$ emissions potential and $CO_2$ intensity for several years (He & Liu 2006).

*Establishing the NACCC*

The process of establishing the NACCC itself is an example of a considerable impact of scientific advice. In 2005, a group of eight scientists from CAS submitted a proposal to Hu Jintao for setting an advisory committee on climate change. Hu Jintao and Wen Jiabao added important comments to the report and called for establishing such an institution. Among the petitioners were Sun Honglie, Chao Jiping and Wei Guoxiong, now members of this committee. The need for such a body was recognized by all, and so policy-makers officially set up the NACCC (Interview 5).

#### *4.2.4 Summary*

During decision-making, experts and policy-makers are in close interaction. Even newcomers and non-mainstream experts can access the process, albeit on an irregular basis. When it comes to regular interaction and valid impact, the traditional institutions dominate. Being appointed by the government, experts from these institutions can draw on the mechanisms of the NACCC and the CCICED to make what are seen as 'valid recommendations' to the leadership. They even can wield influence on central policies like the carbon-intensity targets for the next ten years. Renmin University and Beijing University appear to have slightly less impact at this stage than the other traditional institutions. The State Council's Development Research Centre, as a member of the CCICED, is a more important player at this stage than during agenda-setting.

### 4.3 International negotiation

#### *4.3.1 Access*

Experts have been represented on Chinese negotiating delegations ever since China joined the UNFCCC process. Their number has increased significantly in recent years. As the sole institution, the ERI had sent one researcher to the early meetings of the Conference of the Parties (COP). At recent sessions, about 10 to 15 experts from different institutions have been involved, usually accounting for one third of the delegation. In COP15, a full 40 experts had joined the delegation (see Figure 6).

The tasks of experts participating in the delegation differ greatly. Some may come in their function as representatives of a scientific association, others for basic scientific support or tasked with advising negotiators or even acting as negotiators themselves (Interviews 10, 3, 6). Moreover, experts often present the Chinese position during side-events of the COP (Chao 2009).

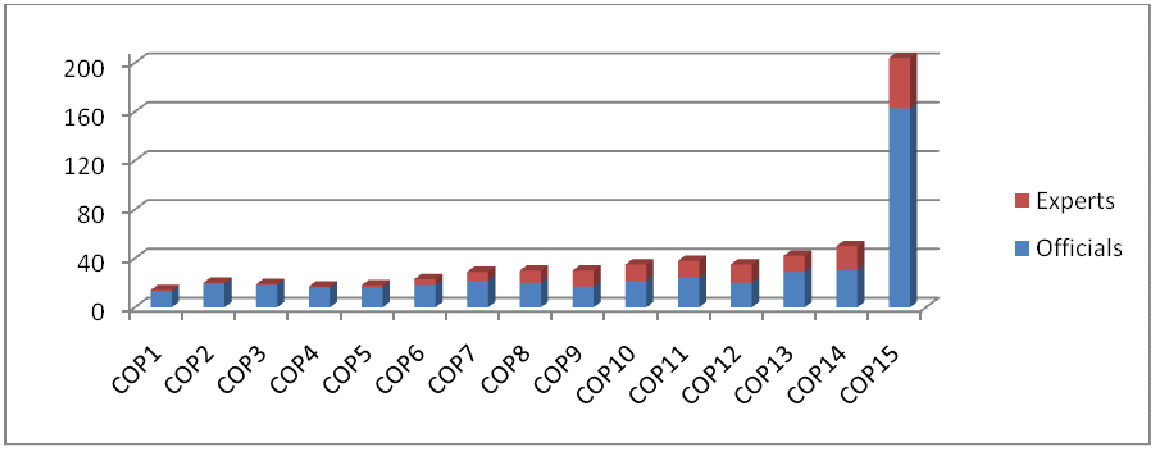


**Figure 6: Number of officials and experts in official Chinese delegations to the UNFCCC's COP meetings**

Source: official lists of participants of COP meetings, available on www.unfccc.int

The ERI, Qinghua University and the CAAS account for the largest groups of researchers, each institution sending about two to four researchers (see Figure 7). The CASS was not represented in the official delegation until COP15, but its experts might have been involved before, without being listed in the official delegation. At COP15, CASS researchers were the largest group. CAS and NCC take part in the delegation only rarely. Similarly, Renmin University and Beijing University, the CRAES, PRCEE and the CAF have seldom been involved.

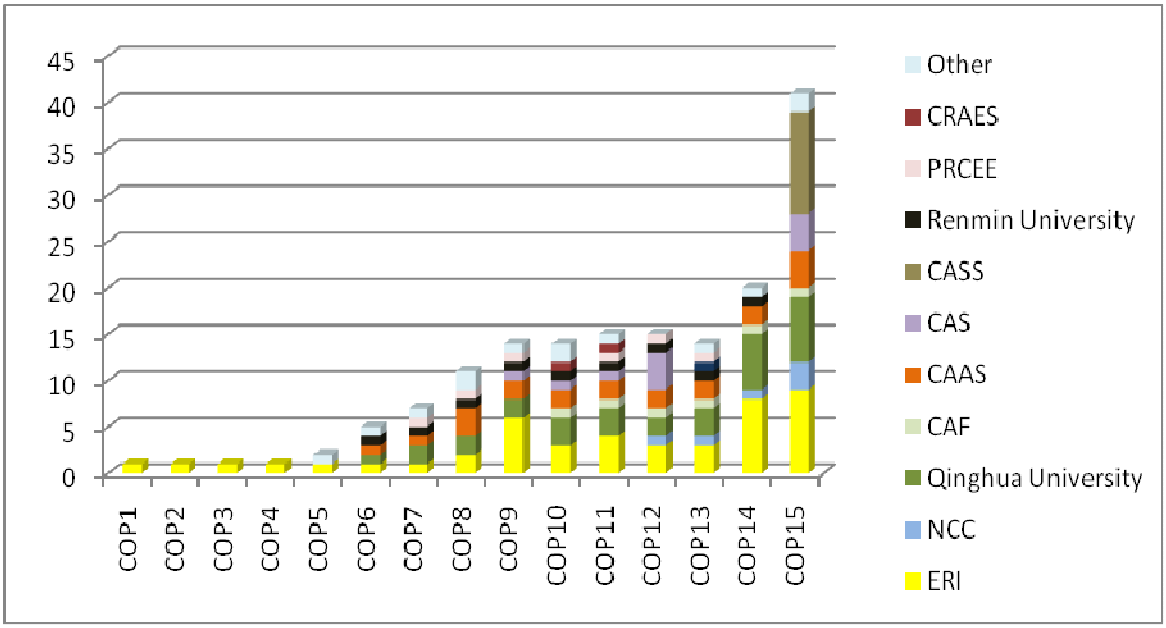


**Figure 7: Number of experts participating in COP meetings, by institution**

Source as Figure 6

A similar structure can be observed in the ad hoc working groups. The ERI, Qinghua University, and CAAS send most experts to the ad hoc working group on further commitments for Annex I parties under the Kyoto Protocol (AWG-KP)[33] (see Figure 8).

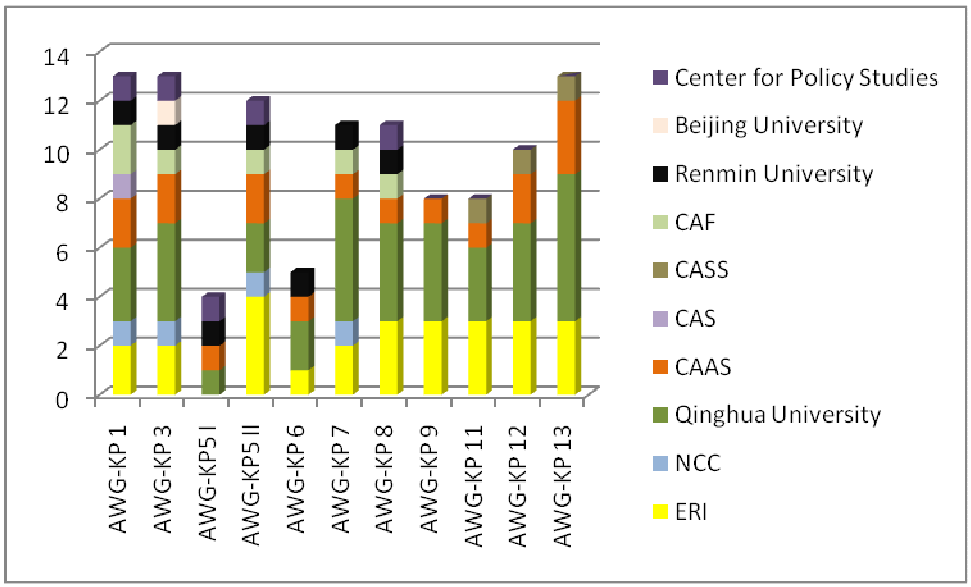


**Figure 8: Experts participating in the AWG-KP meetings**
Note that there are no separate lists of participants for AWG-KP2, AWG-KP4 and AWG-KP10, as these gatherings were conducted in the framework of the COP meetings (see Figure 7). Source: as Figure 6.

### *4.3.2 Validity*

Policy-makers obviously regard all experts in a delegation as legitimate speakers – otherwise they would not be invited to participate. This is particularly true for experts who provide direct technical input. Each of them is responsible for a specific issue: for example, one of the Qinghua experts advises the government on technology transfer. As the issues discussed at the COP and the AWG vary with each meeting, the composition of the expert team is different each time. At especially important COP meetings the division heads of the relevant research institutions join the delegation. But the less important COP and AWG meetings leave opportunities for younger, lower-level researchers to participate in technical negotiations (Interview 1).

Because the CAS and the NCC are represented only in the delegations, their recommendations seem to be taken as less valid statements, while the ERI, CAAS, CASS, Qinghua University, mostly dealing with policy and economic issues, are often the only one to make 'valid' contributions.

### *4.3.3 Action*

Action on scientific advice differs from that during domestic decision-making. Since the general position and strategy are already determined, action takes place more at the micro-level in terms of specific technical recommendations that are adopted by negotiators. A direct mechanism for integrating expertise into negotiations is if experts act as negotiators themselves. As the number of negotiators from the NDRC and the MOFA is limited and the number of issues negotiated in the UNFCCC has increased steadily, experts often serve as negotiators in smaller negotiating groups (Interview 6). We can assume that at least some experts from ERI, Qinghua University, CAAS and the CASS engage actively as negotiators, seeing science as a guiding policy during negotiations.

In this regard, there are differences among ERI, CASS, and Qinghua University. The most influential experts do not participate in technical negotiations or in the plenary sessions of the COP, but join the influential informal consultations to prepare and refine the negotiating process.[34] While high-ranking CASS experts may can attend such a powerful platform, this is not possible for Qinghua researchers (Interview 11).

#### *4.3.4 Summary*

Access to international negotiations is relatively restricted, even some of the traditional institutions participate rather seldom. Those dealing with policy and economic issues have greater impact during negotiations than those dealing with the scientific basis. The economic institutions have considerable impact, as they not only take part in the delegation to COP and AWG meetings, but sometimes join the negotiations in a personal capacity as well. The science–policy interaction is incorporated in these experts personally. There is also a difference between semi-official institutes like ERI and CASS and the only regularly participating university, Qinghua University.

## 4.4 Conclusion

The analysis has shown that experts in China have quite a considerable impact on China's climate change policy. We can note five salient points:

First, the science–policy interaction along all three stages of policy-making is dominated by semi-governmental research institutes. During agenda-setting, the important research projects and research reports are conducted under the guidance of these institutes. They are most visible in state media and receive top attention from policy-makers. During the decision-making process, these institutes make valuable recommendations to the leadership through the NACCC and the CCICED. This is even more striking with regard to experts participating in official delegations to international gatherings. Qinghua University and to a certain degree Renmin University and Beijing University are exceptions. Other universities may participate in agenda-setting and occasionally give recommendations to the government – which shows that the political system is quite open to broader scientific discourse and advice from opposing voices. But these voice are not able to generate stable validity for their advice.

Second, research institutes dealing with climate-change mitigation and the economic and political implications of climate change play a more important role than those focusing on the scientific basis. That does not apply for the agenda-setting stage, where the CAS and the NCC are central actors on a par with the policy research institutes. Even though the CAS and NCC are members of the NACCC (or the Leading Group itself, as is the case for CAS), we can assume that ERI, CASS, DRC and Qinghua University have far closer ties to the NDRC than for example the NCC (Interview 4). As CAS and NCC have hardly any say in international negotiations, this difference becomes clearer during the later stages of the policy process.

Third, while the science–policy interaction is restricted to very few experts, these have a paramount impact. They are important actors in all three stages of the policy process and their advice has been put into action on many instances, also in such central matters as the national $CO_2$ intensity target. Some of the experts believe that scientific consensus among the traditional institutions will lead to governmental action sooner or later in any case (Interview 3).

Fourth, experts are unlikely to realize a stable impact at level three. There is no continuous impact, according to which expertise would be the guiding principle of policy decision. Experts are able to reach this level only occasionally.

Fifth, there is a change of impact over time. ERI and the NCC were early involved in climate change politics, but experts from the CASS and DRC gained influence only later. The newly established NACCC and the increasing share of experts in delegations indicate that expertise is gaining more importance. Furthermore, as the issues of climate change expand over time, there might be more chances for newcomers to contribute, especially as regards very specific and technical issues. Table 6Table 6 summarizes the differing degrees of impact along the three stages of policy-making, by institution:

| | I Agenda Setting | II Domestic Decision-Making | III International Negotiations |
|---|---|---|---|
| **0 Not considered** | | | **DRC**<br>**Most Universities** |
| **1 Recognize relevance and usefulness**<br>**+ Participation** | CRAES, PRCEE, CAF<br>DRC, many universities | **Irregular Interaction**:<br>Many universities<br>**Regular Interaction**:<br>Renmin University, Beijing University<br>CRAES, PRCEE | **Irregular Participation:**<br>**CAS, NCC, CRAES, PRCEE**<br>**Renmin University**<br>**Beijing University** |
| **2 Substantive Conclusions**<br>**+ Participation**<br>**+ Validity/ Valuable** | ERI, CASS, Qinghua University, CAS, NCC, CAAS<br>Beijing University, Renmin University | ERI,CASS, CAAS<br>Qinghua University<br>DRC, NCC,CAS, CAF | **ERI**<br>**CAS**<br>**CAAS**<br>**CASS**<br>**Qinghua** |
| **3 Guiding Policy**<br>**+ Participation**<br>**+ Validity/ Valuable**<br>**+ Action** | **Action on Vulnerability and Uncertainty: Institutions of Level 3:** | **Action on $CO_2$ intensity target and Proposal for Establishing the NCCC: Institutions of Level 3:** | **Informal negotiators:**<br>**ERI, CASS**<br>**Technical negotiators:**<br>**ERI, CASS, Qinghua** |

**Table 6: Level of policy impact of research institutions along the three stages of policy-making**

# 5 Explaining impact

How can we explain the impact level of expertise in Chinese climate-change policy? Three specific questions have to be answered: (1) What explains the dominance of semi-official research institutes? (2) What explains the participation of Qinghua University and, in part, of Renmin University and Beijing University? (3) How can we understand the difference between policy and science institutes? Drawing on two theoretical models, governmental linkages, quality expert knowledge, and personal relations are used as the three independent variables here.

## 5.1 Theory

In order to explain impact, I combine two approaches. The first focuses on the institutional patterns of the science–policy dialogue. Its argument is that the institutional design of the science–policy interaction – autonomy and involvement – determines the impact of scientific advice (Skodvin 2000:4; Underdal 2000a). The second approach draws on the Chinese think-tank literature. Several contributions have identified governmental linkages, expert knowledge and personal ties as the explanatory variables of advisor influence (Glaser 2002; Zhu 2009).

*The integrity/involvement approach of regime theory*

In their analysis of science in international environmental regimes, Andresen et al. (2000) identify autonomy/integrity and involvement as the basic factors determining the role of scientific advice. Autonomy and integrity account for the independence of experts from external intervention, conducting research by the principles of objectivity and disinterestedness and basing their assumptions on the scientific method and on their own academic merits. An autonomous scientific assessment ensures that the advice provided is of high quality and not distorted by political biases. As policy-makers want to get an accurate picture of reality, the quality of research is likely to increase its impact.

Experts also need to be *involved* in some kind of institutionalized and stable channels to transport their findings to the decision-makers – otherwise there would be no opportunity to give advice. Involvement in political mechanisms might entail that experts would have to relinquish their autonomy to a certain degree. Between autonomy/integrity and involvement there exists a certain tension. Underdal (2000a: 9–14) mentions that a good balance between the two should be found. However, they admit in their final conclusion that for many developing countries, less autonomy and more involvement or control might be of greater significance, due to cultural and political context settings (Underdal 2000b). The conflict between autonomy and involvement might also provide a meaningful perspective for analysing the work of experts in China.

*Chinese think-tank literature*

This perspective will be combined with explanations of the Chinese think-tank literature. Very useful are the categories of influence presented by Glaser and Saunders (2002) and later Zhu (2009). Zhu identifies three different sources of potential scientific impact in Chinese foreign policy: *governmental linkages*, *expert knowledge*, and *personal ties*.

*Governmental linkages* with decision-making agencies are a central resource for experts. The positional influence of scientists is very similar to what Andresen et al. (2000) describe as involvement of advisory institutions. From this perspective, an expert is able to gain access to policy-making through his formal position within the government system. Institutes belonging to the same system (*xitong*) as the relevant policy agencies are likely to wield more influence than other institutions do, because they can use stable and institutionalized channels of communication (Skodvin 2000:77). Under positional influence, what counts are not so much qualifications, as position in the research bureaucracy (Glaser and Saunders 2002: 608). Moreover, the higher the rank of the sponsoring agency, the higher will be the influence of the research institute.[35]

Similar to the understanding of integrity/autonomy, *expert knowledge* refers to the quality of expert knowledge. Only if experts can convince decision-makers of the accuracy their research and are not influenced by ideological considerations, are they likely to be heard. Experts who produce independent scientific facts, who have a good educational background, and enjoy academic recognition in their fields have a greater probability of attracting attention from the leadership. The autonomy of research, as Skodvin (2000:74) examines, can be attributed to how experts are funded, recruited, and whether they are politically controlled. Funding from independent sources, an open recruitment process, and operational autonomy to conduct research all indicate a high level of autonomy (Skodvin 2000: 74).

A third resource of influence are *personal ties* (个人关系) between researchers and policy-makers or between researchers. The term *guanxi* refers to the social capital of an individual or a group as a crucial aspect of Chinese society. Actor with enough relations to powerful persons will get resources easily, even without ranking high in knowledge (see Gold et al. 2002). The relationship between former classmates at university, teacher and student, between master and protégée, familial or geographic ties, long-term cooperation, etc. can serve as important channels of influence. A research institution may play a greater role thanks to the personal influence of one of its key figures who happens to have close ties to the leadership (Glaser and Saunders 2002: 612; Bondigual & Kellner 2010: 4).

Based on these three factors, three probability hypotheses guide the subsequent analysis:

1. The greater the governmental linkages, the greater the impact of an institution.
2. The greater the expert knowledge, the greater the impact of an institution.
3. The stronger the personal ties, the greater the impact of an institution.

These hypotheses are not mutually exclusive, but might all apply at the same time. As shown in Table 7, the three variables should be examined on the basis of the following empirical indicators:

| | |
|---|---|
| **Governmental Linkages** | • **Is the institution in the governmental system?**<br>• **What is the administrative level?**<br>• **What is the linkage to the NDRC?** |
| **Expertise/Integrity/ Autonomy** | • **Are analysts from first-ranking universities?**<br>• **How is the institution funded?**<br>• **IPCC Participation?** |
| **Personal ties** | • **Any kind of relationship to decision-makers and among experts** |

**Table 7: Empirical indicators of explaining impact**

## 5.2 Three explanations

During the interviews, 9 of the 12 interviewees were directly asked what they deem to be the most important source of influence for experts. They could choose one or more options from (1) governmental linkages, (2) quality of expert knowledge, and/or (3) personal ties. While all these nine interviewees said that the quality of expert knowledge would be the most important source of expert influence, four thought that administrative linkages would also be important. Only one expert chose personal ties as well. Though this survey does probably not account for the real sources of influence, it does indicate the self-perceptions of experts. The balance between position, expert knowledge, and personal relations is subject to the analysis below.

### *5.2.1 Governmental linkages*

The fact that nearly all of experts with higher impact come from government-affiliated research institutes indicates that having a position close to the government is a relevant resource. Most of non-governmental institutes (such as universities) can achieve only impact level 1. Though the institutional embedding of semi-official institutions is important, there are also differences among institutions. The administrative level of the sponsoring organization is not necessarily the sole determinant. The DRC, directly subject to the State Council, hardly comes up to the impact of the ERI, which is 'only' subject to the NDRC. What appears to be more important is organizational proximity to the decision-making bodies located in the NDRC. Though CASS and Qinghua University can achieve very high impact, it can be argued that the ERI on many instances has been more closely involved in the policy process than these two institutions (Interview 3). As noted, the ERI has direct and internal channels for accessing the NDRC Climate Change Office, with several meetings a month and using internal bulletins (内部通报) to submit its recommendations (Interview 3).

In contrast, weaker sponsoring agencies seem to have weaker research institutes as well. The Ministry of Environmental Protection plays a minor role in the policy process. Correspondingly, the PRCEE and CRAES often have less influence than other semi-official institutes do. Similar to the decreasing influence of the CMA during the policy process,

the NCC has an outstanding position during agenda-setting. But during decision-making, even though NCC experts are members of the NACCC, the NCC emerges as weaker than ERI, CASS and Qinghua, as it has less close relations to the NDRC.

Although it has less impact than the ERI, the emergence of the DRC is probably due to its institutional background. Being a latecomer, later than many universities, the DRC started systematic policy research on climate change and low-carbon society in 2008, but could immediately access Xie Zhenhua, head of the Chinese delegation. This influence was, in absence of a long research history (Interview 7), possible only through its affiliation to the State Council. Also the CASS and the CAS enjoy privileged access to the leadership, drawing on the communication channels with the State Council. However, it seems that institutional linkages cannot fully explain their impact, as CASS researchers have sometimes admitted to having less close ties to leaders (Bondigual & Thierry 2009:15).

Governmental linkages might also provide an explanation for the especially high level of impact of semi-official institutions. They have day-to-day interaction with officials and are in many cases appointed by the government, which generates a high degree of trust between these experts and policy-makers. As these experts are embedded in governmental structures, policy-makers can expect them to provide not merely expertise, but expertise that is in accordance with the general policy framework. Actually, many of these experts take on the function of both expert and official, turning them into 'amphibious' actors who regularly cross the borders between science and politics. It is this dual character that enables them to wield influence at levels two and three in an autocratic system.

The influence of Qinghua University, Renmin University and Beijing University seems puzzling case: they have considerable impact, but have no official institutional linkages with the government. It is true that these universities are close to the government – for example, Renmin University fosters future top cadres. All the same, these universities are placed outside the outer orbit of the governmental system.

### *5.2.2 Expertise and Integrity*

Expert knowledge and academic merits are becoming an increasingly important resource of impact. Older division heads sometimes have only Master degrees, whereas younger heads normally have PhDs, mostly from first-ranking universities or well-known foreign universities. Experts at semi-official research institutes regularly publish academic articles, many of which are published in the most prestigious Chinese academic journals or even in well-known international journals. For example Ding Yihui, one of China's leading meteorologists and member of the NACCC, who attended Colorado State University and the University of Hawaii at the beginning of Deng's reform era (CMA 2010a), has published many influential articles in foreign journals and participated in drafting several IPCC reports.

The quality of knowledge might help to explain the leadership of the Chinese Academy of Sciences (CAS) with regard to the scientific basis of climate change. The CAS closely resembles a Western-style honorary society (Cao 2004: 1). CAS researchers (院士) have become a unique group of elite scientists in China, possessing a reputation similar to that enjoyed by their counterparts in other countries, such as members of the National Academy of Sciences in the United States or the Royal Society in England (Cao 2004: 14). Although the CAS has close ties to the Chinese state leadership, it might be primarily its scientific status that enhances its positions. Furthermore, the CAS is fairly independent from political interference: its researchers are selected without any political influence, and only an estimated 2% of them are party members (Cao 2004: 150). In general, preserving scientific autonomy and integrity is even more of paramount importance for those scientists dealing with the scientific basis. Their primary purpose is often not to exert political influence but to provide research for everybody (Interview 4). The same applies to the universities (Interview 6).

The knowledge acquired by researchers at Qinghua University is probably the most important source of influence for that institution, which enjoys an outstanding reputation as one of China's best universities, leading in many disciplines. The influential role of Qinghua University might be explained by its comprehensive scholarly background which includes economics, engineering, public management and social science (Interview 6). Many experts in the state bureaucracy and the CAS have degrees from Qinghua University. The research centres at the Institute of Nuclear and New Energy Technology have been among the first to do research on climate change and the Clean Development Mechanism. Its head, He Jiankun, embarked on low-carbon research very early (Zhou 2009). Furthermore, its Department of Environmental Science and Engineering was founded in the early 1980s, developing a leading position in domestic research. The important influence of the Qinghua University shows that high-quality knowledge can be enough of a resource to join the club of semi-official research institutes. On the other hand, the fact that Qinghua has slightly less influence during international negotiations than the ERI or the CASS indicates that this knowledge basis might at times have lower priority than government linkages at this stage.

But even if the importance of knowledge-based impact has increased over time, the continued dominance of semi-governmental research institutes might be a result of their research experience. Actually, this seems to be a combination of their governmental linkages and expert knowledge. When climate change became an international issue in the late 1980s, climate-change research in China was mainly government-led, conducted within semi-official research institutes. Due to their semi-official status, the traditional experts could start research relatively early, generating a knowledge basis impossible to achieve overnight. Consequently, even if more experts are now working on climate change, in particular from the civil sector, these traditional institutes still have a knowledge advantage. Non-governmental experts are, however, expected to gain more impact in the decades ahead.

Concerning the financial resources of research, most research institutions are quite independent from the agency to which they are affiliated. Research at the NCC, CAS, CAAS, and Qinghua University is mostly funded by the Ministry of Science and Technology (MoST), the Natural Science Foundation, and the CMA. Within the general framework defined by MoST and the NDRC, experts can apply for projects (Interview 4). The ministries to which the research institutes are affiliated sometimes sponsor smaller projects, but often pay only for the operational costs.

Due to the limited funds granted by the NDRC, the research branch of the ERI is heavily dependent on international funds to conduct research. Similar to the CASS and Qinghua University (Interview 6), the ERI draws on funds from the British embassy, the World Resources Institute (WRI) or the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). In contrast, the ERI's climate change department, which is in direct support of the negotiations, is largely funded by the NDRC. However, views and interests sometimes differ as to what should be researched, and there international funds can enable experts to pursue their own research preferences (Interview 3).

Another indicator of the importance of knowledge is the background of NACCC members. Many of them are renowned specialists in their discipline with years of experience in environmental and climate change-related research (Interview 3). Four of the 12 members have contributed to the IPCC assessment reports.

Formal studies abroad are probably an increasingly important factor. More of the younger experts have studied at foreign universities, often in the USA, Great Britain or Japan. International experience in general is, however, not restricted to semi-official think-tanks. Many universities have cooperation agreements with foreign universities and their professors have international backgrounds. On the other hand, their international experience, though important, does not mean that they automatically play a role in domestic climate politics.

A more important factor of international experience is participation in drafting the IPCC assessment reports, whether as leading author, contributor or reviewer. On average some 25 Chinese authors have contributed to each of the four assessment reports. Most of them come from CAS, CAAS, and ERI. In addition to some researchers from Qinghua University, there are also Chinese researchers involved from Beijing University, Nanjing University, Tongji University and others.

### *5.2.3 Personal ties*

It is noteworthy that most interviewees do not attribute importance to personal ties, even though these relations play a significant role in the political system in general. One reason might be that experts from semi-official institutes can take recourse to institutional linkages to secure their influence. Though not an important aspect for the institution itself, personal relations might be more important for the individuals within these institutes. If individual experts strive to get a position at one of these institutions and can draw on personal ties with important persons, then this will certainly promote their personal career plans.

Personal relations seem to be of greater importance for universities and other civil institutions. Qinghua University is a telling example for building up an effective policy network in the government. A degree from or position at the same university is a strong linkage, linking many in the previous and current leadership. Zhu Rongji, former premier minister, held a professorship at Qinghua University in the 1980s concurrent with his political functions (Li 1994:21). Of the nearly 200 members of the 14th Central Committee of the Communist party, 29 had degrees from Qinghua University, whereas graduates of Renmin University, the second largest group, accounted only for six members (Li 1994: 25). Three out of nine members of the Communist's Party Standing Committee of the Politburo graduated from the Qinghua University: Xi Jinping, Wu Bangguo, and current President Hu Jintao (People's Daily 2007). Xie Zhenhua, head of the Chinese delegation, has a degree in engineering from Qinghua University (Xinhua 2002a).

The technocratic elite represent a useful contact point for Qinghua experts. For instance, the advisory committee of the Laboratory of Low Carbon Energy at Qinghua University,[36] headed by NACCC member He Jiankun, includes representatives from the NDRC, the MoST, and other ministries. Remarkably, former vice premier and former Politburo member Zeng Peiyang heads the committee as Honorary Director General (Qinghua 2010b). Also he graduated from Qinghua University and has been minister in charge of the NDRC (People's Daily 2010). Recently, he has held important speeches on climate change (Central Government 2007b; Xinhua 2010).

A similar situation might apply to the Renmin University (or People's University, as it is also known). Its influence centres on the person of Zou Ji, who had been advising the government on technology transfer at international negotiations until he agreed to head the WRI in China. This post at international negotiations has subsequently been succeeded by a researcher from Qinghua University.

Contrary to these observations, one interviewee argued that many Qinghua University graduates are employed in the government, but that the relationship between teacher and former student is not important for accessing the government (Interview 12).

Another kind of personal network is available for experts who belong to the Communist Party. Membership is an important asset if an expert wants to become president of a research institute or head of department. For party members, contact with officials or leaders is likely to be more frequent and intense, opening up new opportunities. But despite party membership, experts will not have much influence unless they can produce good research. Indeed, to a certain extent, some experts even see party membership as an impediment to scientific research (Interview #).

## 5.3 Summary

To sum up, administrative links can explain the predominance of semi-official research institutes. The effect of these links is important during domestic and international negotiation, while it is less relevant during agenda-setting. In general, governmental linkages are the most important resource.

Secondly, governmental links alone are not enough to exert valuable influence, as the quality of knowledge is increasingly important. Instead, the impact of semi-official research institutes is based on their knowledge advantage in comparison to latecomers. Academic reputation is a paramount resource for Qinghua University and the CAS, allowing a very high impact. Knowledge can now be seen the second most important resource, and is becoming even more important.

Thirdly, personal ties may have some influence, in particular for Qinghua University and other universities. But these ties appear to be less important than the first two variables. Newcomers in particular might conceivably have to draw on these ties in order to gain impact, but this would require further inquiry.

## 6 Conclusions

This analysis has examined the impact of China's research institutions on the country's climate-change policy and offered three variables to explain impact. Semi-official research institutes, affiliated to governmental agencies or the State Council, emerge as the most influential experts. Policy-makers generally accept the substantive conclusions of semi-official institutes and of Qinghua University. In some cases, these traditional institutions may establish science as a *guiding policy* with regard to assessing vulnerability and uncertainty, national carbon-emission intensity targets, and experts as negotiators. In contrast, other universities have varying access to agenda-setting and domestic negotiation, but their advice is rarely taken as valid, nor does it tend to lead to political action.

Governmental linkages explain much of the relative strength of semi-official research institutes. The quality of knowledge is becoming increasingly important, a necessary condition for impact for all actors – the universities in particular. Personal ties appear less central, but might be important for universities and newcomers.

These results indicate that one variable alone cannot explain impact. A tentative hypothesis can be offered: that research institutions must base their impact on a combination of resources. In order to achieve impact, semi-official research institutes will have to acquire governmental relations and expert knowledge, and universities and civilian research institutes need expert knowledge and personal relations.

We can draw four conclusions from these findings.

First, the analysis sheds light on the role of experts in China's climate-change politics. In contrast to the common generalization that politics rank above science in Chinese climate change politics, the results presented here indicate that experts are in fact important actors involved in the political process. While the influence of institutions engaged in research on the scientific basis may diminish during later stages, this gives rise to economic and policy experts. The close governmental linkages provide semi-official institutes with an impact that might be even more intense than in other, democratic, settings.

Secondly, the analysis has highlighted some points for improving the science–policy dialogue in China. Including more scientific stakeholders

without close linkages to the government would be an important step towards democratizing politics. In particular, more universities should be involved in important projects such as the National Assessment Report or be admitted to the NACCC. This broadening of stakeholders should be seen together with the increasing influence of civil society on environmental politics (Ho 2001). This is a matter not only of inclusion, but of capacity as well. Many of China's universities probably still lack a comprehensive knowledge basis. Thus, national science policy and international cooperation should focus on strengthening the research in universities and civil research institutions. Due to limited financial resources, the government has concentrated funding into few state key laboratories, so that they may achieve world-class status (Kinoshita 1995). Such a policy, though effective, tacitly accepts the relative weakness of other research institutions. A further point concerns transparency. The system still appears very opaque to outsiders, as many advisory services are not publicly available. The NACCC seems a mysterious body to the public and even many semi-official researchers. Transparency could help to avoid misperceptions of China and its politics of climate change.

Thirdly, the approach set out here can provide a precise framework for estimating impact. However, the major limitation of the positivist framework is its strict distinction between science and politics as two separated spheres. This distinction removes the opportunity to analyse the dual nature of semi-official research institutes, as both expert and political. Similarly, the role of the CMA can be hardy analysed if viewed as either a scientific or a political organization. Instead, positivist approaches are concerned with whether a policy is 'scientific' or 'political' and whether an expert is open-minded or controlled. Rather than transferring scientific advice from the sphere of objectivity to the political sphere, the science–policy interaction could be conceptualized as a process of translating reality and constructing certain objects of truth that contain both scientific and political statements. This opens up a chance for constructivist approaches such as discourse analysis, epistemic community, advocacy coalitions, or actor-network theory to analyse China's experts. Indeed, the 'traditional institutes' identified above could be thought of as an 'epistemic community'.

Fourthly, this study provides a basis for future research. Many questions remain to be examined in greater detail. Our findings about the impact of Chinese experts have limited explanatory power unless compared with other countries. Only comparisons with, for example, the USA or Germany can really elucidate the relative impact of experts.[37] Furthermore, research should focus more on the contents of impact. Some examples have been given where expertise could translate into action; it should be further examined which issues expertise can function as a 'guiding policy' or not. This study has focused on semi-official research institutes and a few selected universities: further research should analyse the role of other universities and civilian research institutes.

## Notes

[1] The agency was known as the State Planning Commission until 1998, when it was renamed the State Development Planning Commission. It received its current name in 2003.

[2] For a detailed description, see Yu 2008.

[3] The official name of the group is 'National Leading Group on Climate Change, Energy Saving and Emission Reduction' (国家应对气候变化及节能减排工作领导小组).

[4] The coordination committee was originally established in 1990, led by the Chinese Meteorological Agency, but was renamed the NCCCC in 1998 after the NDRC took the lead. The NDRC is still the major actor (Zou 2008).

[5] The Climate Change Department of the NDRC also serves as the office of the leading group (NDRC 2010).

[6] The ministry's name was previously State Environmental Protection Agency.

[7] The government had supported research on climate change at least since 1986 (MoST, p.13)

[8] A similar typology classifies think-tanks into governmental, specialized academic institutes, and university-affiliated think- tanks (Liao 2006).

[9] Often written 'Tsinghua' in English.

[10] All these are first-rank universities directly administered by the Ministry of Education.

[11] These include the Chinese Association for Science and Technology, the Chinese Society for Environmental Sciences, the China Society of Natural Resources and the Ecological Society of China (Qi/Ma 2007, p. 10).

[12] This is a simplified account of science theories; Callon (1995), for example, distinguishes four different types.

[13] Kuhn has been one of the first to propose a new understanding of science, arguing that the scientific revolutions are occurring in paradigms. These paradigms do not emerge solely according to scientific and rational reasoning, but may also involve non-scientific factors like persuasion and power (Kuhn 1996). But within, these paradigms, Kuhn assumes that 'normal science' still works according to the rules of rationalism set out by the traditional view (Skodvin 2000, p. 36).

[14] A research institution must be distinguished from a research institute, which is only one type of institution. Institutions include private and public institutes and universities.

[15] The label seems reasonable, as many semi-official institutes call themselves 'research institutes'.

[16] Cobb and Elder (1983, p.14) call it the 'systematic' and the 'formal' agenda

[17] Impact of expertise is understood as a broad category, including the access to, the validity of expert information in, and subsequent action of the policy process. It is to be distinguished from influence in the sense that impact does not necessarily imply the intention of the experts to have impact. For an examination of impact, see below.

[18] On this method see Flick (2002: 75).

[19] Hu Jintao used the English term, 'low-carbon economy', in a speech at an OPEC meeting in Australia in 2007. At least since then China's economists have become very keen on this topic.

[20] In 2008, 11% of total projects were related to energy and 12% to resources and environment (MoST 2010a).

[21] This statistic refers only to the leading agencies of the projects, and does not include the huge number of other participating institutions. For example, the National Climate Centre is involved in many of these projects, but is never the leading agency. The universities involved include Qinghua University, the Chinese University of Geology, Tongji University, Shandong University and many others.

[22] The data were obtained from the project data base of the Foundation (NSC 2010), searching for projects with the keywords 'climate change' (气候变化).

[23] CMA and subordinated organizations publish the most renowned Chinese journals, *Acta Meteorologica Sinica* (气象学报), the *Journal of Applied Meteorological Science* (应用气象), and *Meteorological Monthly* (气象). The Energy Research Institute (ERI) publishes the journal *Energy* (能源).

[24] On the concepts of knowledge brokers, see Litfin (1994).

[25] Under the UNFCCC, all convention members are obliged to communicate information about national circumstances, vulnerability assessment, financial resources, transfer of technology, and public awareness (UN 1992, Art. 12).

[26] For example, Zhang Meiying, Vice-Chairman of the Chinese People's Consultative Conference, mentioned findings of the report in a recent speech (China Daily 2010).

[27] If not indicated otherwise, translations are made by author.

[28] The report received *pishi* by the leadership, which means that leaders deemed it an important report which should be circulated and read by other decision-makers as well.

[29] For instance, the first of those was the National Advisory Committee for State Informatization (国家信息化专家咨询委员会), founded in 2001. Similarly, the National Energy Leading Group set up the National Energy Advisory Committee in mid of 2007 and the Foreign Ministry created the ministerial Advisory Committee on Foreign Affairs of the Ministry of Foreign Affairs in 2008.

[30] These are 2007 data: membership might have changed since then.

[31] CAAS and Qinghua University also have members, but these researchers do not deal with climate change.

[32] More institutions might be involved, but my interviews could not verify this.

[33] The working group was established in 2005 to consider further commitments of industrialized countries under the Kyoto Protocol for the post-2012 period.

[34] Because these meetings are often held in English without translation (Gupta 2000, p.16), they are open only to Chinese experts with a good command of English.

[35] According to Zhu (2009, p. 341), the level of the research institute is factually one grade lower than that of its sponsoring agency.

[36] The advisory committee provides strategic guidance for the Laboratory's development and evaluates its research activities.

[37] Useful tools for comparison include civic epistemology (Jasanoff 2005) and the research framework of the COMPON project (http://compon.org/).

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