Chinese Climate Policy – Institutions and Intent

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Tome 12

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Foreword

William Ramsay*

Until the late 1990s, the balance of Chinese energy production and consumption was treated by the rest of the world as a net figure. No-one knew what was going on inside the Chinese economy – it was a black box. As far as anyone was concerned, the Chinese would not soon be a major factor in world energy markets.

Energy policymakers realized how totally blind they were in 2004 when Chinese electricity production could not keep up with internal demand and the world experienced a surge in liquids demand as Chinese entrepreneurs fired up generator sets across the economy. The incremental Chinese demand was a factor in the price surge that year that had been building since the OPEC accord in 1999. It was probably the catalyst for the spike but we didn't have the data to know. Times are certainly changing, but it is still only twilight in that black box.

No country has confronted the need to collect data and formulate coherent policy for nearly a billion and a half consumers. State enterprises were set up to manage key energy-sector activities, but coordinating among them proved difficult. A number of institutional arrangements have succeeded each other until now, when stronger energy policy and administrative functions of the National Development and Reform Commission (NDRC) are gaining traction. NDRC vice-chairman

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Zhang Guobao has maintained a steady hand on Chinese energy-policy evolution for several years – overseeing the increasing coherence of Chinese domestic and international energy policy – but the tension with powerful state enterprises and other vested interests still effectively defies efforts to truly centralize and co-ordinate Chinese national-level energy policy and program authority.

The first of the three studies looks back into the nature of Chinese institutions and governance for insights into how they function and to identify some of their limits, so as to pinpoint the nature of the forces that drive or constrain change within China's energy sector. Not surprisingly, institutions and practices continue to reflect millennia of Chinese history, which in some measure focused on nurturing the authority of an emperor. Students of China, who have long recognized its "command and control" economy, are now aware of the limits of those concepts and the consequences of a bureaucratic hierarchy living in a sometimes conflicted condominium with the Communist Party, even as the economy surges on.

The second study seeks to answer the questions: What are the economic and strategic drivers of Chinese energy policy? How does China plan to manage its increasing reliance on foreign sources of oil, gas and now coal? How will these drivers shape the guiding principles of Chinese national companies and their relations with international operators and foreign sources of energy resources? How does China define and shape its international diplomacy and practices in order to succeed in its quest to secure access to upstream oil, gas, coal and uranium – just to mention the fuels?

The third study explores the Chinese approach to climate change. The Chinese have long been victims of their own internal deserts and know only too well the challenges that the power of nature imposes on their society. The recent spectacular growth of the Chinese economy has left China with a plethora of weeping environmental wounds. While these are increasingly urgent short-term challenges, Chinese leaders are only too aware that, in the longer term, under any probable climate change scenario, China is a loser.

Chapter One

The Institutions of Energy Governance in China

Philip Andrews-Speed*

Introduction

The manner in which mankind manages and uses energy resources is currently of great concern to governments and peoples around the world. Fears of supply shortages, tensions over access to resources, and apprehension about the predicted negative impacts of climate change have greatly intensified the need to improve the quality of governance of energy, at both national and supranational levels. Yet efforts to improve the quality of governance are all too often constrained by poor understanding on the part of those involved in the formulation and execution of energy policy: poor understanding of the technical and economic characteristics of the energy sector, and poor understanding of the political economy of the energy sector in their own countries. But the greatest obstacle to enhancing the degree of constructive engagement between

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nations in the field of energy lies in the ignorance of the frameworks for energy governance in other countries.

International collaboration, in any form, requires trust, and such trust is built on understanding. In the case of collaboration in the field of energy, potential partners need to have an appreciation of frameworks for energy governance in each others' countries. Only then can they accurately interpret the data, the statements and the declared commitments provided by other parties.

Nowhere is this ignorance of greater relevance to today's challenges than in the case of China. The size and rate of growth of China's economy, of its energy demand, of its energy imports and of its atmospheric emissions of various types make this country an essential major partner in any regional or global discussions relating to the production and consumption of energy. Yet such is the size, diversity, complexity and lack of transparency characterizing China's energy sector that external parties find it very difficult to interpret the information emerging from the country and the actions and statements of the government. No shortage of information exists. Indeed it might be argued that there is too much information on China's energy sector: too much information and not enough understanding.

The premise of this chapter is that an improved understanding of the institutions of governance of China's energy sector will allow us to better appreciate current structures and policies, past policy decisions and outcomes, and the possible trajectories for future policies and policy outcomes. In short, it should provide us with valuable insights into events, trends and behaviors.

To address this apparently simple objective requires an examination of a wide range of issues, including the origins and nature of China's institutions of governance, the processes of policymaking and policy implementation, and the priorities and behaviors of actors in the energy sector. This would allow an assessment of how well suited the institutions of governance are to addressing China's current and emerging energy challenges, especially in respect of the formulation and

implementation of new policies to address these new challenges in a sustained manner.

Attempts to understand the political economy and governance of China's energy sector were first stimulated by the energy crisis of the 1970s.[1] But it was the opening of the energy sector to foreign involvement that brought the first systematic attempt to analyze policymaking and implementation, reflected in the classic works of Lieberthal and Oksenberg.[2] The growing global importance of China's energy sector in the first years of the 21st century has seen a wave of publications seeking to throw light on the governance of this sector.[3] A number of these accounts have explicitly or implicitly drawn on the vocabulary and concepts of new institutional economics, an interdisciplinary field of the social sciences which provides a useful way to analyze institutions of governance. When integrated with an appreciation of the role of ideas in shaping policy, new institutional economics provides a powerful framework to understand the forces that drive or constrain policy changes and economic development.

This chapter builds on these works by focusing explicitly on the institutions of governance and on the role of ideas in order to identify the main determinants of the nature of the current institutions of energy governance in China, and thus the main determinants of the nature of policies affecting the energy sector and of their outcomes. The main objective is to elaborate the nature of the forces that drive or constrain change within China's energy sector. It is intended as a preliminary account, sketching out some key variables and examining how they may be interpreted as affecting processes and outcomes.

The first section outlines the concepts that will be applied to the analysis and develops a framework for identifying a number of drivers and constraints for change within a national energy sector. In the next two sections the concepts relating to institutions are elaborated in the context of China; first, with respect to embedded institutions and, secondly, with respect to

1 Harrison (1977); Hardy (1978); Woodard (1980).
2 Lieberthal and Oksenberg (1988).
3 Constantin (2007); Andrews-Speed (2004); Kong (2006); Downs (2006); Meidan *et al* (2009); Rosen and Houser (2007).

the institutional environment. The subsequent section applies this understanding to a number of facets of the governance of China's energy sector in order to identify the roles that institutions, ideas and other variables have played in determining the path of China's energy policies. The concluding section draws out briefly the implications for future energy policy development in China.

Policy change: drivers and constraints

The academic literature on government policymaking and implementation is extensive and draws on many disciplines. This section does not aim to review this literature, but rather it briefly examines selected concepts and approaches that can be used in combination to try to elaborate the drivers and constraints on policy change. It starts with an examination of relevant concepts on governance and institutions, with special emphasis on the approach taken in the field of new institutional economics. This approach is then supplemented by including the role of new ideas and of discourse. The section ends with a simplified framework for examining the role of institutions in policy change in China.

Governance and institutions

The word 'governance' can be interpreted and applied in different ways. For international economic organizations, governance involves the management of economic and social affairs by government; for example, through allocating public resources and resolving conflicts between actors, exercising political authority, establishing and operating institutions, and formulating and implementing policies.[4] Measures of governance quality include accountability, participation, predictability, transparency, efficiency and effectiveness.[5] A broader and more overtly political approach takes into account democratization, human rights and social equity.[6]

4 World Bank (1992).
5 Asian Development Bank (1995).
6 Howell (2004).

In contrast, transaction-cost economics and new institutional economics express the concept of governance in much more general terms. In the words of Oliver Williamson, "Governance is an effort to craft order, mitigate conflict and realize mutual gains."[7] This approach focuses on the governance of transactions where a transaction is defined as the transfer between actors of a physical good, a commodity, a legal right or a natural resource.[8] In this context, a governance structure may be "thought of as an institutional framework in which the integrity of a transaction, or related set of transactions, is decided".[9]

This leads us to the question of identifying and describing institutions. The study of institutions and of their significance in policy and economic development is far from new, and a number of different approaches have been taken.[10] The strength of new institutional economics has been its ability to build on the principles of transaction-cost economics by drawing on other sub-disciplines of economics as well as on the fields of political economy, sociology and even psychology to explain economic and political phenomena. Indeed, the sheer diversity of influences on the field of new institutional economics has led to diversity in understanding the nature of 'institutions'.[11]

Two complementary approaches are used to inform the current analysis. The first defines institutions as "humanly devised constraints, formal and informal, and their enforcement characteristics".[12] The second approach elaborates this definition and sees institutions as a shared set of beliefs and expectations, represented by rules, that govern social and economic interaction.[13]

These two approaches have been integrated by Williamson in a scheme that identifies three levels of institution.[14] At the

7 Williamson (2000).
8 Williamson (2000); Hagedoorn (2009).
9 Williamson (1996, p. 11).
10 Hall and Taylor (1996).
11 Kingston and Caballero (2009).
12 North (1990, p. 3).
13 Aoki (2001, p. 10); Greif (2006, p. 33).
14 Williamson (2000).

highest level are informal institutions that characterize the society in question. These include traditions, norms, customs, beliefs, and expectations – in other words, the prevailing culture. Far from being consciously devised by humans, these characteristics are deeply embedded in the society and are likely to have a long history.

At the second level are the formal institutions that have been designed by humans. Most important in the study of economics are the political system, the bureaucratic structures of government, the judiciary and legal system. Also of great importance are the general features of the law relating to property rights, contract and dispute resolution, systems for policy-making and implementation, and the role of civil society.

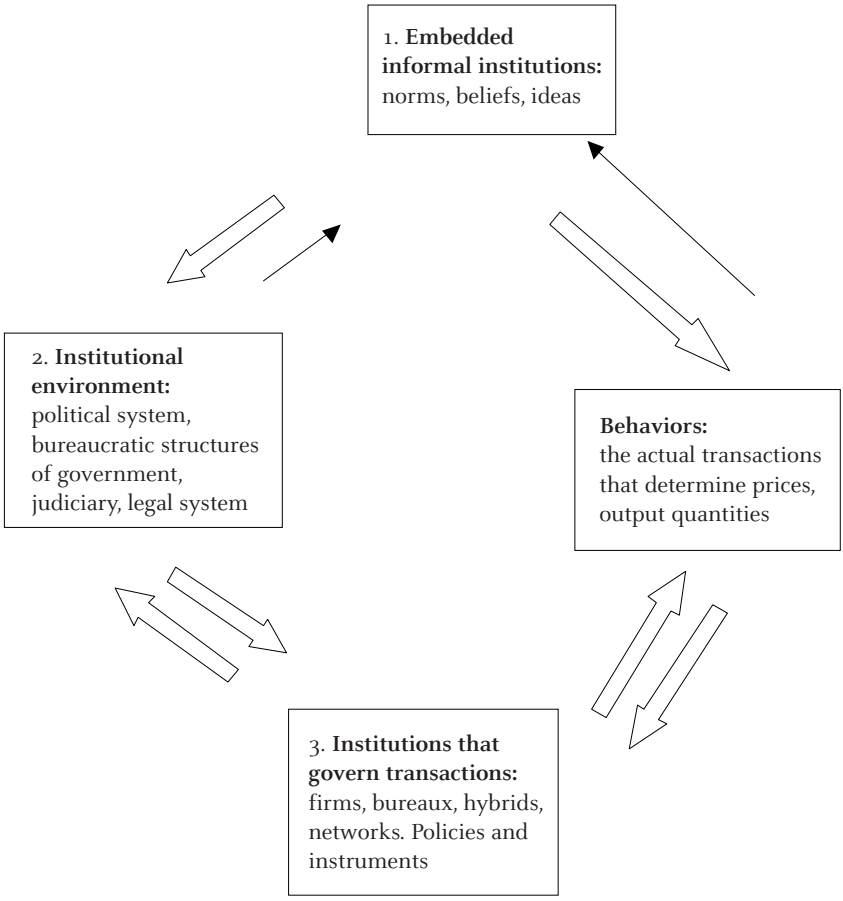
At the third level are the structures that govern individual transactions; for example, firms, markets, government bureaux, networks, and various hybrid structures. Conventional transaction-cost economics focuses on these institutions, on explaining why different types of structure evolve in different sectors or industries, and on examining the way in which these structures shape the way transactions are carried out.

This 'model', as originally presented by Williamson, sees a vertical linear relationship between levels one, two and three, where level one is at the top and where each level exerts a strong determining force on the level below and ultimately on the actual transactions themselves. Though the scheme allowed for limited feedback from lower to higher levels of institution, it has since been argued that institutions can be changed through the repeated actions of individual economic actors.[15] Thus the formal institutions and the institutions that govern individual transactions may be shaped as much by actors' behavior as by higher-level institutions. Given that the behavior of actors in turn may be greatly shaped by embedded beliefs and norms, the linear scheme of Williamson may be usefully adapted to a circular scheme (see *Figure 1*).

The most significant implication of the new institutional economics approach to analyzing economic history is that

15 Aoki (2007).

Figure 1: A diagrammatic representation of the three levels of institution and how they determine or constrain behaviors in transactions (wider arrows indicate greater influence)



Source: Adapted from Williamson (2000)

institutions constrain the pace and direction of economic and political development. North and Greif, among others, have convincingly shown that this framework assists in identifying the variables that appear to have played a key role in determining the different paths of economic and political development taken by different nations at different times.[16] In other

16 North (2005); Greif (2006); Blyth (2002).

words, the institutions themselves, as well as the policies, are path-dependent and, as a consequence, the development of a nation or of a society is also highly path-dependent.

As well as helping to explain why certain societies were able to take advantage of new circumstances, the study of institutions can assist in identifying pressures for change. Incompatibility or 'friction' between different levels of institution or between institutions may create instability in the governance structures and provide the opportunity or the necessity for change.[17] In the terminology of transaction-cost economics, a failure to align governance structures with transactions leads to a failure of governance, and to subsequent conflict and eventual crisis.[18]

The role of ideas, social learning and discourse

The importance of ideas in the evolution of institutions and policies is explicitly recognized by new institutional economics through the inclusion of those ideas in the embedded informal institutions that provide the framework for formal institutions and underpin societal behaviors. But ideas also play a significant role in the policymaking process, in the operation of the institutions of governance, and in the behavior of actors.[19] This role may constrain change or may stimulate change.

'Old' ideas take the form of mental models or paradigms within which political agendas are set and policy choices are made. On the one hand, these paradigms constrain change because decisions about what issues are important and what actions to take are all made within the framework of the prevailing paradigm. On the other hand, an actual or perceived failure of a paradigm, or rather of the policies flowing from a paradigm, provides the opportunity for the introduction of a new idea or new paradigm. The appearance of new ideas, even without the failure of the old paradigm, may also provide an opportunity for change.[20]

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17 Lieberman (2002).
18 Williamson (2002).
19 Beland (2005).
20 Hall (1993); Beland (2005).

The reaction of government and society to paradigm failure or to the appearance of new ideas is highly variable. In principle, an opportunity for change may be provided by the failure of a policy or of a paradigm, or by incompatibility or friction between prevailing ideas and institutions of governance.[21] Yet government and society are often willing to accept *ad hoc* adjustments that are made to policies rather than reject the paradigm. This then creates internal inconsistencies within the prevailing policy paradigm. Indeed, a 'new' idea may be presented as being consistent with the 'old' paradigm, even though it is self-evidently in contradiction.[22]

Policy changes involve social learning. First-order policy changes, such as adjusting the instruments of policy, and second-order changes, such as introducing new instruments, require social learning solely within the state itself. In contrast, third-order policy changes, such as the adoption of a new paradigm or a totally new set of goals, require social learning across society. Policy entrepreneurs are needed to 'sell' the ideas both within government and to economic actors and to society at large.[23] The need for extensive social learning is not restricted to the introduction of new policy paradigms but is also relevant to the introduction of new institutions, such as the rule of law.[24]

The success of these policy entrepreneurs in persuading all the parties to accept the new paradigm or new institution depends not just on the extent of failure of the old paradigm and on the attractiveness of the new paradigm. Success or failure also depends on the way in which the ideas are framed for the wider public and on the systems of discourse prevailing in that society.[25] Even a radically new idea must be framed in a way that appeals to existing values and ideas.

Discourse is a key way to gain wider engagement in the policy process and two types of discourse may be identified. 'Coordinative' discourse relates to the process of policymaking.

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21 Lieberman (2002); Schellenbach (2007).
22 Cox (2004); Hall (1993); Beland (2005).
23 Hall (1993).
24 Engel (2008).
25 Beland (2005).

'Communicative' discourse involves the persuasion of wider society. In societies where power is concentrated in the hands of an elite or where policymaking takes place within an elite group, the primary role of discourse is communicative, to persuade the general public. In contrast, in more pluralistic societies, a greater emphasis is placed on coordinative discourse and thus a much wider involvement of society is achieved in the process of policy formulation.[26] Thus, the nature of the discourse and the role of discourse in policy change and economic development are heavily dependent on the nature of the prevailing institutions, especially the informal, embedded institutions.

Finally, new policies require implementation. The process of implementation will be eased if the new policy has been framed in a way that is consistent with wider beliefs and norms and with the institutional framework, and if there is widespread understanding and agreement with the policy. Further, the government needs to invest political effort and administrative resources. In terms of new institutional economics, the critical concern is the degree of fit between the formal institutions of governance and the new policy instruments which govern individual transactions, and also between these new policy instruments and the transactions themselves.[27] Factors such as the structure and functioning of government bureaux, the nature of any federal system of governance and the nature of the legal system are central to such an analysis.

Drivers for and constraints on policy change

The preceding account identifies a number of aspects of the manner in which institutions and ideas may drive or constrain policy change and economic development. But many other factors are also important (*Figure 2*). In the context of the current analysis, we will distinguish factors which are endogenous to the institutional systems from those which are exogenous and relate to other, often no less important, variables.

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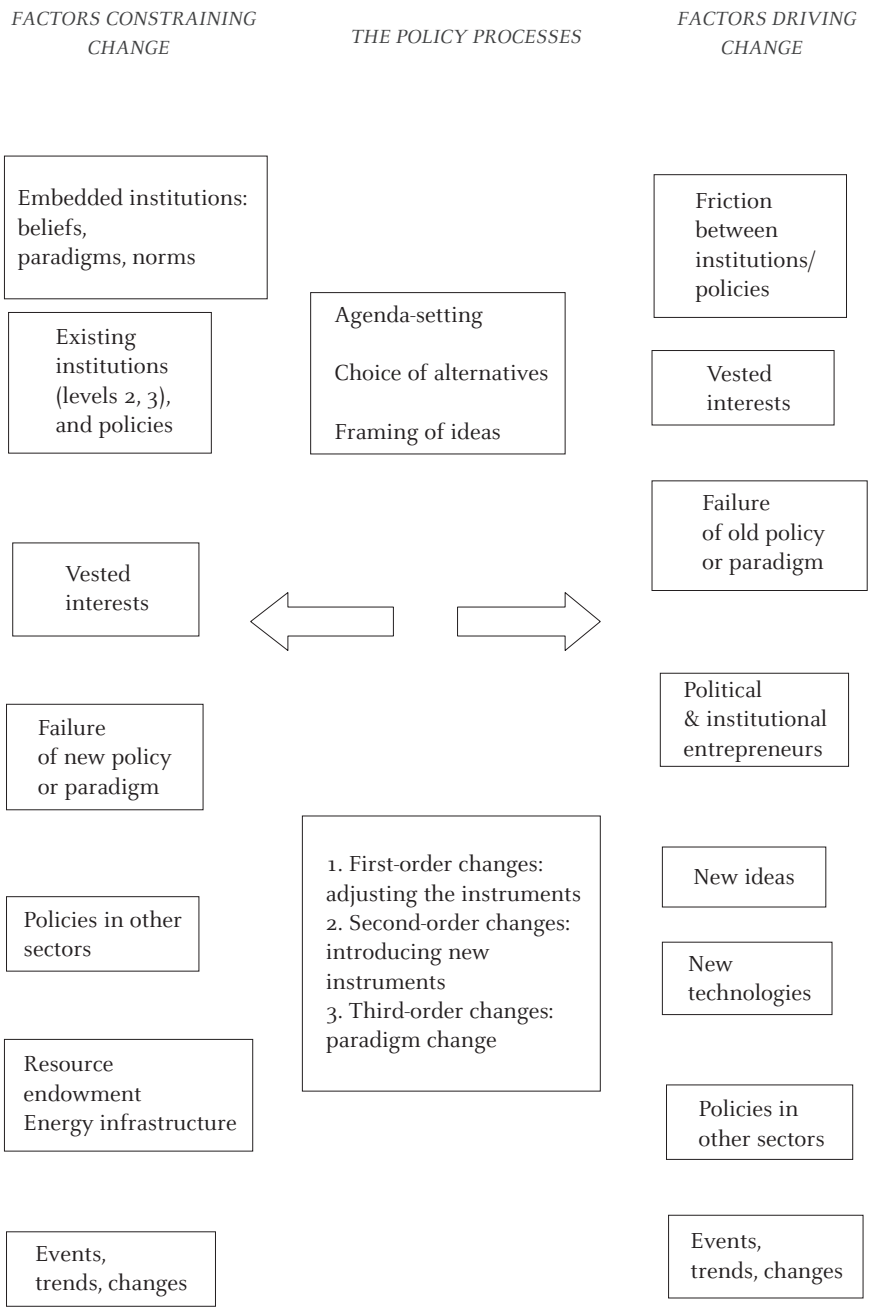
26 Schmidt (2002).
27 Williamson (2000).

Figure 2: Factors driving and constraining change



The main endogenous forces constraining change include the different dimensions of institutional structure, as well as the vested interests of actors seeking to resist change, and the failure of newly introduced policies or paradigms. On the other side, endogenous factors which may drive change include various types of 'friction' or incompatibility between institutions, policies and ideas, the failure of a pre-existing policy or paradigm, and the political and institutional entrepreneurs who seek to stimulate change.

One further important variable lies within the context of institutional structure, but has not been explicitly addressed above. In terms of Williamson's presentation of the three levels of institution, explicit formal policies and their expression as policy instruments lie within the levels of the institutional environment and of the institutions which govern individual transactions. When a specific sector is being analyzed, it is useful to distinguish policies that are directed specifically at this sector from policies that either govern all sectors or govern other sectors which have links with the energy sector. Given the central position of energy in any modern or modernizing economy, a large number of sector policies have close links with the energy sector, most notably macro-economic policy, industrial policy, financial and banking policies, foreign policy and social-welfare policies. For this reason, the heading 'policies in other sectors' is explicitly identified as a variable, within the institutional framework but external to the energy sector. These policies may variously act as a driver or as a constraint on policy innovation and change in the energy sector.

Outside the realm of institutions of governance lie a number of variables which may play a strong or even predominant role in driving or constraining change. Constraining factors which are exogenous to the institutional structure are of three types. The first, and arguably the most important, is the nature of the primary energy resource endowment and the existing energy infrastructure in the nation under consideration. The primary energy resource endowment cannot be enlarged or its composition changed. In the case of non-renewable resources, it can only be depleted. Most energy infrastructure is built at great cost to last 20-30 years or longer.

The second variable relates to the critical and often quite unpredictable role that 'events' can play in driving or constraining change. Events, trends or other changes may provide the necessary rationale or impetus to persuade a government to enforce a long-contemplated change. Conversely, an event may convince the government that certain policy options are not feasible and should be abandoned. These events, trends or changes may be political, economic, social or even physical in nature, and may be domestic or foreign.

Finally, the proposed scheme includes new technologies, for these always have and will certainly continue to play a vital role in the development of the energy sector. New technologies have the potential to offer dramatic opportunities to change the manner in which the energy sector is managed and in which long-term strategies are formulated. Such technologies relate to the extraction of primary resources, the generation of renewable energy, the transformation of energy into useful forms, the consumption of energy, and the management of the environmental impacts of energy production and consumption. Though new technologies are indeed a driver for change, they operate within the wider context of all the other variables identified (*Figure 2*).

China's embedded institutions

As described above, the analysis of embedded institutions focuses on beliefs, ideas and norms which are embedded in the culture and which shape behavior. Three types of belief and norm may be identified:[28]

- Behavioral beliefs: beliefs about behavior of others
- Internalized norms: socially instituted behavioral standards
- Internalized beliefs: mental models and paradigms

In this section we examine a limited selection of features of China's embedded institutions which can help elaborate our later analysis of the governance of China's energy sector, looking first at behavioral beliefs and internalized norms, and secondly at specific mental models and paradigms relevant to the energy sector.

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28 Greif (2006, p. 36-37).

Behavioral beliefs, internalized norms and governance

A thorough analysis of China's long cultural history and its influence on societal behaviors and on state governance is far beyond the scope of this chapter. But it is essential to examine, albeit briefly and superficially, some aspects of this complex subject in order to shed light on what we observe today in China's energy sector.

China's culture is deeply influenced by its origins as a hydraulic agrarian regime. Such regimes tended to be characterized by a high degree of central control and a lack of tolerance of alternative centers of power. Indeed, unlike in post-feudal Europe, stable and long-lived alternative centers of power – such as the landed nobility, the church and the city merchant guilds – did not exist in Imperial China. On the one hand, the central government exerted considerable control over those resources and behaviors which were critical to its retaining power. On the other hand, such was the size of its realm that the state was willing and indeed obliged to leave many aspects of family and village life outside its purview.[29]

Critical to the longevity of China's imperial history was the role of ideology in building and sustaining a moral order, and the consequent preference for conformity and acceptance of a highly hierarchical society.[30] In the absence of alternative centers of power or of structures of civil society, the family became the critical unit of society, supplemented by wider networks of personal relations, known in Chinese as *guanxi*.[31]

These long-lived structures and pressures have led to one further characteristic of Chinese society that sometimes baffles outsiders – the approach taken to the balance between 'truth', on the one hand, and ritual and appropriate action, on the other. Without delving too deeply into what is a complex and contentious subject, it is not unreasonable to assert that the search for and a striving to adhere to a 'pure' theoretical truth

29 Wittfogel (1952, mainly p. 101-136).
30 Pye (1992, p. 12-16, 238-240).
31 Jenner (1992, p. 103-128).

plays a less important role in determining individual behavior in Chinese society than it does in some other cultures. Rather, individuals in China have a tendency to attach greater importance to the appropriateness of their words and actions in the prevailing social context, and on anticipating the consequences of these words and actions. Form may often be of much greater importance than substance. This culturally embedded characteristic was re-emphasized by Mao who asserted that truth should not be based on theory, emotions or religion, but on social practice.[32]

The implications of these general features of China's culture on the systems of governance and on individual behaviors are profound. Here we just note a few which can be interpreted as having significant potential to affect the governance of the energy sector.

Chinese government under the rule of the Communist Party has remained highly centralized, at least in principle, and government and society continue to be strongly hierarchical.[33] Though the number of individuals and organizations involved in elite policymaking is growing, the process remains centralized and low in transparency. Within the political elite lies a fundamental tension. The policymaking process may be obstructed by deep rivalry between factions based on *guanxi*, loyalty and, possibly, ideology, and yet the elite must present a public face of consensus. The policy process and this factionalism rarely percolate down to society as a whole. As a consequence, the characteristics required by those aiming to reach the summit of political power are those relating to loyalty and to skills in bureaucratic competition and negotiation, rather than those relating to formulating and pushing through specific policies and the ability to communicate with society as a whole. Rhetoric and slogans remain a key tool for the state to communicate important ideas and changes in policy to society at large, but individual acts of persuasive oratory are rare. Rather, leaders and bureaucrats seek to outdo each other in their repetition of the consensus view, encapsulated in

32 Blum (2001, p. 86-87, 124-125, 157-159).
33 See for example: Pye (1992); Lieberthal (1995); Fewsmith (2001); Oksenberg (2001); Dittmer (2001).

slogans.[34] Against this perspective must be set the real and effective steps which the government has taken to increase the professionalism of the civil service, the incentives they are offered and the systems within which they operate.[35]

Guanxi forms an important feature of both political and economic spheres in China. This phenomenon has many expressions. At one extreme the term *guanxi* can refer to a purely personal relationship with few overt obligations beyond those of an emotional bond. At the other extreme is the 'instrumental' form of *guanxi* where one or both of the parties build the relationship in the expectation of a material return. In between and overlapping these extremes are numerous dimensions of human relations relating to social behavior and the search for consensus as well as loyalty.[36]

In addition to its role in elite politics mentioned above, the practice of *guanxi* brings two important practices to China's economic activity, one largely beneficial and the other definitely harmful. The first relates to the networks that entrepreneurs and companies build up in order to gain access to resources, to share information, to smooth flows in incomplete markets, and to seek protection from events and from the government in the absence of strong institutions and the effective rule of law. Indeed, it can be argued that such networks have not only played an important role in driving China's economic growth, but have also shaped its evolving institutions of governance.[37] Though the need for and the practice of *guanxi* may be diminishing in society itself, the practice appears to be flourishing in business and industry, not only between private parties but also between the public and the private sectors.[38] This latter relationship tends to take the form of clientilism, whereby the patron is more powerful than the client. In contrast, *guanxi* is, or is more likely to be, presented as a relationship between equals.[39]

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34 Pye (1992, p. 197); Lieberthal (1995, p. 173).
35 Burns (2004).
36 Guthrie (1998); Guo (2001).
37 Horowitz and Marsh (2002); Hsu (2005); Krug and Hendrischke (2008); McNally (2008a).
38 Yang (2002).
39 Pye (1992, p. 21); Sapio (2009).

In its harmful forms, *guanxi* underpins the prevalence of corruption in China, and is further supported by its cousin, clientilism.[40] A full examination of all forms of malfeasance and official misconduct is not relevant to our analysis. Rather, our focus will be economic corruption of different types, whereby public power is used for private gain. In most cases the corrupt parties are seeking through illegitimate means to gain access to rents which have been created by prevailing systems of economic governance.[41] This may involve individuals, groups and even entire organizations. Practices that have been particularly significant in China in recent years include abuse of the previous dual-pricing systems, obstructing the entry of new players into a market, abuse of public funds, manipulation of public investment and procurement procedures, and abuse of the process of privatization of public assets.[42] On a much larger scale, it is possible to classify as corruption the practice whereby government seeks to protect its own economic interests or those of state companies through administrative monopoly. This practice may be applied at the level of an industrial sector or across an administrative region.[43]

Whilst it is clearly very difficult to document reliably the changes in the scale and type of corruption, a number of general features may be identified. The total number of incidences of corruption appears to have grown during the 1990s, both in absolute terms and as a proportion of aggregate acts of malfeasance. Though the total number of new cases of corruption stabilized or even fell in the late 1990s, the proportion of major cases involving high-level officials and large amounts of money grew.[44] This trend seems to have been accompanied by the expansion of overt, collective corruption, reflecting the tightening embrace between political power and capital wealth.[45]

Alongside corruption lie the long-standing practices of false reporting and feigned compliance which have

40 Hsu (2005).
41 Wedeman (2004); Ngo (2009); Sapio (2009).
42 Guo (2008); Ding (2000).
43 Guo and Hu (2004).
44 Wedeman (2004); Guo (2008).
45 Gong (2002).

characterized the behavior of government officials in China for centuries and have persisted through Mao's rule to the present day.[46] The origins of these behavioral patterns lie not just in the preference for outward harmony over truth, in the weak accountability of public officials, and the near absence of effective checks and balances to their behavior, but also in the nature of the incentives that officials are presented with. Since the 1980s the focus of government policy has been on economic growth and the performance of government officials at all levels, at least those involved in economic activity, has been measured in purely economic terms, most usually GDP growth or some other concrete economic target.[47] In Mao's time, it was little different, but then the targets were physical output rather than economic growth. In the absence of effective external audit, officials are easily tempted to produce statistics that match or exceed the targets required of them.

Mental models and paradigms

Mental models or paradigms are frameworks that individuals and groups use to interpret events and phenomena and to frame ideas and policies. The importance of paradigms to the formulation and implementation of energy policy has been emphasized in recent years, for example with respect to the United Kingdom.[48] Three types of paradigm may be identified which have direct relevance to China's management of energy and natural resources. These relate to man's relationship with nature, to a preference for self-sufficiency, and to a drive by the state to control the use and management of natural resources.

The country's main ancient philosophical traditions explicitly addressed the relationship between man and nature and emphasized the close interdependence between them. Whilst both Confucianism and Taoism stressed the need for balance between man and nature, both strands of belief included adherents who believed that man had the power to control and conquer nature.[49]

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46 Pye (2002, p. 237); Lieberthal and Oksenberg (1988, p. 23); Tsai (2008).
47 Lieberthal (1995, p. 146-147).
48 Helm (2007); Mitchell (2008).
49 Economy (2004, p. 30-36); Miller (2006); Ronan (1978, p. 222).

More convincing than any arguments based on philosophy is the evidence from history itself. Indeed, the very seeds of Chinese civilization germinated on the realization that man needed to control water. Four thousand years ago the Emperor Yu was the first ruler to systematically carry out extensive large-scale projects for flood control, irrigation and inland water transport.[50] Thereafter, the constant struggle to gain political power and then to retain it led to an environmentally destructive cycle of warfare and economic development. Respect for nature remained subordinate to the call of power.[51]

This was not a feature of China alone, but lay at the heart of the rise of other early 'hydraulic societies' in which the control of water lay at the heart of political power, for example Sumer, Assyria, Egypt and India.[52] Such an approach to the management of water, the environmental and other natural resources lay in stark contrast to and in tension with the collective decision-making processes that typified local communities in the very same societies and which showed greater awareness of the values of sustainable development.[53]

The pre-eminence of Communist theory and practice in the governance of China since 1949 has, if anything, accentuated such an approach to natural resources and the environment. The early decades of the Communist regime saw explicit statements to the effect that natural resources were boundless, and what was required was a greater ability to mobilize society to exploit them. Further, economic development should be pursued regardless of the cost to natural resources and the environment.[54]

This approach has expressed itself in various forms, from the unquestioned desirability of building very large dams, the subordination of environmental and social concerns to energy production, and the relatively low priority attached until recently to energy efficiency and social welfare.[55] Indeed, it has been argued that Mao took historical traditions to new extremes in his calls to

50 Ronan (1995, p. 190).
51 Elvin (1998); Economy (2004, p. 36-43).
52 Wittfogel (1957).
53 Benvenesti (2008).
54 Woodard (1980, p. 13-19).
55 Economy (2004); Andrews-Speed and Ma (2008).

conquer nature.[56] Though many countries and cultures may be accused of taking such an approach to nature at some periods in their economic development, China would appear to be exceptional in the duration during which and the intensity with which this belief has been held. Such a view should, however, be moderated by consideration of more nuanced analyses of the actual practices of natural-resource management in the early years of Communist rule, which show that efforts were made to constrain or reverse the negative environmental impacts of agricultural development.[57]

China's attitude to self-reliance and external economic relations has varied greatly during its history. The great wealth and variety of its natural resources rendered a policy of self-reliance more viable than in most other countries. Yet the nation was a significant participant in international trade during some of the periods when its economic power was greatest; for example, in the Later Han (1st and 2nd centuries A.D.), Tang (7th to 9th centuries), Song (11th to 13th), and Qing (18th and 19th) dynasties. Much of this trade was carried out by foreigners – Middle Eastern, East Asian and European. Only in the Song period did Chinese traders themselves become a powerful force. It was this dominance of trade by foreigners and their unsavory practices that led the rulers of the late Qing dynasty to take a strong, negative approach to international trade.[58]

After the Communists took power in 1949, a high degree of self-reliance became an immediate necessity as the West failed to recognize the new regime. The Soviet Union stepped in to provide technology and skills which had the potential to play a key role in the development of the energy and mineral sectors. But China was left on its own when the Soviet Union withdrew its support in 1960.[59]

The search for self-reliance in the energy and mineral sectors was accentuated by the belief that these sectors should drive growth in the rest of the economy.[60] The rapid develop-

56 Shapiro (2001, p. 1).
57 Ho (2003).
58 Fairbank and Reischauer (1989); Rodzinski (1991); Spence (1990).
59 Dorian (1994, p. 55-62); Lieberthal (1995, p. 76-77); Brammall (2009, p. 153,363).
60 Dorian (1994, p. 35-36).

ment of the Daqing oil field in Heilongjiang Province during the 1960s became emblematic of the 'heroic' self-reliance of the New China.[61]

China's distrust of the outside world took a new turn during the world energy crisis of the 1970s and early 1980s. The shortage of oil and the high prices were seen as part of a conspiracy hatched by the rich nations in order to further subjugate the Third World, thus further confirming the need for self-reliance. The crisis was interpreted as a Marxist struggle between the rich and the poor, and as a consequence China welcomed the shift in the balance of power towards the oil-rich states.[62]

Though the open-door policy introduced in the 1980s did result in foreign involvement in the economy, participation by foreign companies in the domestic energy sector remained restricted to those activities for which foreign technologies and skills were absolutely necessary.[63] These included offshore oil exploration, offshore and onshore gas production, nuclear power, liquefied natural gas and the manufacture of large-scale turbines.[64] Indeed, the main objective for the government in inviting foreign involvement in China's energy sector was to maximize the country's ability to be self-reliant in energy supply. This preference for self-reliance was exacerbated during the 1990s after China became a net importer of oil, and is reflected not just in government policy but in the attitudes of citizens, even of university students.[65]

The search for self-reliance was accompanied by the preference for direct government involvement in natural-resource projects, especially if they were critical to the interests of the state. In Imperial times, the state became closely involved in projects crucial to its power, such as hydraulic engineering, manufacturing weapons and other military hardware in Imperial Workshops, and the mining of raw materials critical for weapons, for currency and for daily life such as copper, iron, lead, tin, zinc, and salt.[66]

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61 Kambara and Howe (2007, p. 17-23).
62 Woodard (1980, p. 13-25).
63 Keith (1986).
64 Andrews-Speed (2004).
65 Constantin (2007); Zweig and Ye (2008).
66 Ronan (1994, p. 3-19); Golas (1999, p. 425).

State control over industry was an integral part of the economic policy of the Communist Party after 1949, especially for heavy industry.[67] Government involvement in the energy sector was implemented initially through Ministries for Petroleum, for Coal and for Electrical Power, and, more recently, through state-owned energy companies. Despite recent commercialization, these companies remain under relatively tight government control, especially those owned at central government level. This contrasts with the state of enterprises in most other sectors of the economy which have been largely released from government control and, in many cases, fully privatized. Energy, other natural resources and rail transport remain the exceptions to this general trend of liberalization.[68]

During Imperial times, where the state was not itself directly involved, it tended to take a very relaxed view of natural-resource exploitation. This was especially notable in the case of mining. Officials tended to dislike unofficial mining operations as these would divert labor from more important agricultural tasks. At the same time, though noting the poor working and living conditions of the workers, they took few steps to address them. Likewise, the state took few steps to create systematic procedures to manage the nation's mineral resources. This contrasts sharply with the body of mining law that was established in late medieval Europe.[69]

The institutional environment

As discussed above, the institutional environment comprises the formal institutions of the state – both organizations and systems, including government organizations, political parties and the legal system. Efforts to analyze the nature of the state and of the institutions of governance in post-Mao China consistently encounter the apparent dichotomy between, on the one hand, an apparently powerful central government and a unified system of governance and, on the other hand, a fragmented and chaotic structure over which the central

67 Brammall (2009, p. 89-91).
68 Andrews-Speed (2004).
69 Golas (1999, p. 417-427).

government has little control. Indeed, taking an historical perspective, it has been argued that China "is a civilization trying to squeeze itself into the format of a modern state".[70] A further apparent contradiction relevant to the institutional environment can be seen in the deliberate steps the government has been taking to enhance the role of law in society and in the economy, while the rule of law continues to be subordinated to administrative fiat.

This section first examines some of the features of the formal institutions of the state, highlighting the main sources of fragmentation which undermine the authority of the state. It then shows how the Communist Party is a critical unifying factor in counteracting this fragmentation. Finally, we identify the key features of the evolving legal system.

Formal institutions of the state

The fragmented nature of China's institutions of governance was documented in some detail by Lieberthal and co-researchers in a series of publications in the 1980s and 1990s.[71] More recent analyses have drawn conclusions that China is a "dual development state",[72] a "polymorphous state",[73] or a "diffuse developmental state".

This fragmentation affects both the vertical and horizontal links in the formal organizational structures of government. Though China remains a unitary state in theory, the last thirty years have seen the development of an increasing degree of *de facto* federalism.[74] The Center has delegated substantial policy-making powers to the Provinces. Lower levels of government, particularly at the County level, have gained considerable influence over policy implementation. The powers wielded by different levels of government have been acquired, or lost, through bargaining and negotiation.[75] Only in rare cases have they been defined by law. In the other dimension, the Ministries and other

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70 Pye (1992, p. ix).
71 Lieberthal and Oksenberg (1988); Lieberthal and Lampton (1992); Lieberthal (1995).
72 Xia (2000).
73 Howell (2006).
74 Shirk (1992, p. 59-60); Goldman and MacFarquhar (1999); Montinola *et al* (1995).
75 Lieberthal (1995, p. 292-313).

major government agencies form important axes of power from the central government level to as far down as the county.

The impact of this disaggregated structure on policymaking has been exacerbated by three facets of government in China. First, the framework is notably short of formal definitions of the powers and scope of authority of the component institutions, of clear statements of practice and procedure, and of explicit guidelines for inter-institutional relationships. Second, and partly as a result of the first, institutions are highly personalized and dependent on the character, power and connections of the leader, as are relationships between institutions.[76] Informal networks are of great importance.[77] Third, the system is very hierarchical. All institutions and all individuals of any importance hold a specific rank, and this rank is a critical determinant of the geometry of policy bargaining.[78] Negotiation takes place between institutions and individuals of equal rank.[79]

In addition to the fragmented nature of government, the power of the state-owned enterprises remains a critical feature of China's economy. In the days of the planned economy, the large state industries were either ministries or reported directly to a ministry. For this reason the few remaining large state-owned enterprises retain considerable influence at the highest levels of government.[80] As a result, the largest state-owned enterprises continue to play an important role in policymaking and, partly as a consequence, they are able to retain dominant positions in their respective sectors. Nowhere is this more important than in the energy sector.[81]

As a consequence of this fragmentation, multiple centers of power and influence exist and China's governance of economic and industrial policy lacks the key unified sense of purpose and unified governance structure which can be found in typical 'developmental states'.[82] To date, China's

76 Lieberthal (1995, p. 183-218).
77 Xia (2000, p. 214-218).
78 Lieberthal and Oksenberg (1988, p. 142-157).
79 Shirk (1993, p. 92-106).
80 Shirk (1993, p. 107-115).
81 Andrews-Speed (2004); Kong (2009).
82 McNally and Chu (2006).

government has failed to create a 'superministry' to guide industrial policy. Even the steps taken in 2009 to create a set of 'superministries' to govern different parts of the economy failed to effectively address the needs of the energy sector, as will be discussed later in this chapter.

Instead, a highly heterogeneous state has emerged from the remains of the Leninist state of Mao. The central government may indeed have lost a certain degree of authority or control over the lower levels of government and of industry, but of greater importance is that the last thirty years have seen a substantial "reconfiguration of state power" and that the nature and extent of this reconfiguration varies greatly across the country.[83] As a consequence, China today is characterized by contradictory juxtapositions of autonomy and clientilism, developmentalism and predation, and control and chaos. Multiple centers of power, institution-building and economic development prevail, and political and economic rivalry exists at and between all levels of government.[84] Indeed, institution-building is driven as much from the bottom, at the local level, as from the top, but the nature and development of these local institutions is highly heterogeneous and greatly dependent on the pre-communist and communist economic and political history in each location.[85]

The Communist Party

Such fragmentation would rapidly lead to a breakdown of government were it not for a number of unifying or articulating instruments. The most important of these remains the Communist Party.[86] The Party is the most powerful organization in China and is intimately intertwined with all government agencies, from central to village level, and with all state-owned enterprises. Even the People's Liberation Army is subordinate to the Party rather than to the government or to the President. As a result the Communist Party is pre-eminent in all major *political* decision-making.[87]

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83 Baum and Shevchenko (1999).
84 Xia (2000); McNally and Chu (2006); Howell (2006).
85 Krug and Hendrischke (2008); Horowitz and Marsh (2002).
86 Krug and Hendrischke (2008).
87 Pollack (1992); Lu (1996); Lieberthal (2005, p. 208-218); Naughton (1996, p. 285); Krug and Hendrischke (2008).

In the sphere of economics it might appear to the outsider that the role of the Party is not so great, and that the government *sensu stricto* wields real power. This distinction may have little meaning for a number of reasons. First, nearly all government officials of any significant rank are also party members and subject to the discipline of the Party. Secondly, most institutions and enterprises have a Party hierarchy that parallels the management hierarchy, and at the top of these hierarchies the Party Secretary nominally or, indeed, actually has more authority than the senior manager. Finally, few important economic policy decisions lack substantial social and political implications.

What has changed in the last twenty years is that the power of political ideology as a unifying force has diminished as real differences of opinion and belief have emerged over the speed and nature of economic reform.[88] Indeed, China's success in reforming its economy and sustaining a high rate of growth over the last three decades can be attributed to a great extent to the willingness and ability of the Communist Party to be flexible and to adapt. The top leadership has repeatedly amended its economic policies and strategies, generated new slogans and rhetoric, and modified internal Party organizational structures, systems and incentives in order to meet the prevailing challenges.[89] Among the more important internal reforms have been the slow introduction of more democratic processes, the institutionalization of the elite succession procedure, an enhancement of the level of technical and administrative competence of party members and officials, and willingness to include members of the private sector.[90]

Set against these changes are a number of characteristics that have their roots in the Party's Leninist history and even in China's Imperial past. Though less concentrated than before, power within the Party continues to be wielded by a relatively small elite.[91] This elite sees its role as defining the common

88 Lieberthal and Oksenberg (1988, p. 158-160); Lieberthal (1992); Fewsmith (2001).
89 Shambaugh (2008).
90 Shevchenko (2004); Fewsmith (2001); Perry (2007); Shambaugh (2008, p. 34-35, 104); Manion (2008); Feng (2008).
91 Fewsmith (2001).

good and setting the framework for its achievement. Implementation requires the development or adaptation of ideology, of rhetoric and of slogans, and their dissemination through propaganda. The role of society is to follow the Party.[92] Key policy instruments continue to include political and economic campaigns and mass mobilization.[93]

The period 2001-2005 saw the creation of four successive ideological campaigns, each with its specific policy objectives: "The Three Represents", "The Socialist Human Society", "Scientific Development" and "Democracy with Chinese Characteristics".[94] For eighteen months during 2005-2006 the Party carried out a rigorous "rectification campaign" for Party members at all levels, which included study groups, self-criticisms and criticism.[95] Campaigns may be directed at perceived political threats such as the Falun Gong. Outside the political sphere, the Party is able to support the government in policy campaigns. One of the most notable was that to address the challenges of SARS (severe acute respiratory syndrome).[96] In the energy sector such campaigns have been launched to address safety in small-scale coal mines and energy efficiency, as will be discussed below.

As a consequence of this combination of adaptability and use of well-tested techniques, the Chinese Communist Party (CCP) continues to retain a strong hold over political and economic power in the country and is able to defend attacks on its power.[97] This authority is reinforced by the Party's tight control over career progression within government and in the wider public sector, as well as in state-owned enterprises.[98]

Nevertheless, the last two decades have seen some dispersion of power, a loss of importance of the Party at village level, the continued inclusion of incompetent officials, and a decline of reputation on account of the corruption of Party officials.[99]

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92 Pye (2001).
93 Perry (2007); Shambaugh (2008, p. 128).
94 Shambaugh (2008, p. 111-124).
95 Shambaugh (2008, p. 129-130).
96 Perry (2007).
97 McNally (2008b).
98 Cheng (2000); Heilmann (2005).
99 Baum and Shevchenko (1999); Fewsmith (2001); Shambaugh (2008, p. 122).

Further, the Party continues to face a fundamental dilemma in its promotion of market forces whilst retaining a preference for direct control over key economic sectors.[100]

Policy decision-making and implementation

In addition to the Communist Party, a number of other mechanisms hold the fragmented infrastructure of government together. Policy decisions tend to be made by consensus after wide consultation through meetings and the circulation of documents. These are reinforced by personal links and informal institutional networks.[101] Research institutes and think-tanks of various types and affiliations have blossomed. These not only provide policymakers with information, skills, ideas and policy proposals, but also provide a useful web of links between different strands of government.[102] Unlike their counterparts in the West, few of these think-tanks are independent of government or state enterprises. Despite their dependence on government, their role is not formalized and the way their ideas flow to key decision-makers may be dictated by those top leaders.[103]

The need for consensus is, arguably, the most significant attribute of China's economic decision-making. Consensus is reached more through bargaining between the parties than by persuasion.[104] Bargaining occurs horizontally between government ministries, agencies and state enterprises, as well as vertically between different levels of government. The leaders of individual institutions are expected to argue for the interests of their institutions, and competition between institutions is deliberately encouraged.[105] Institutions and enterprises will jealously guard the information they hold, further enhancing their power over decision-making.[106] Ideas and proposals are only formally synthesized at the level of the Commissions and above.

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100 Heilmann (2005).
101 Lieberthal and Oksenberg (1988, p. 151-157); Xia (2000, p. 214-218).
102 Halpbern (1992).
103 Naughton (2002).
104 Lieberthal and Oksenberg (1988, p. 23-24); Lampton (1992).
105 Lieberthal and Oksenberg (1988, p. 23).
106 Halpbern (1992).

Though the top leaders prefer decisions to be reached by consensus at lower levels, this competitive environment, combined with the ability of any of the parties involved to veto a proposal, results in an upward-directed tide of problems awaiting a decision. These problems accumulate at the level of the Commissions or, more usually, at the State Council, for even the Commissions are sub-divided by sector. This process may be described as 'management by exception' and results from the reliance on consensus and the failure to allocate clear responsibility for different types of decision.[107]

Thus the political elite, the top leadership, far from being a key initiator of policy often appears to wait for policies to emerge from the lower levels. If consensus has been reached at lower levels of government, the leadership will most likely approve. If the lower levels cannot reach a consensus, the elite either have to arbitrate between competing proposals, choose to drive the policymaking process themselves, or postpone the decision. Given the number of unresolved issues that rise to the highest levels of government, the last of these courses of action, the non-decision, is probably the most prevalent. Only rarely does the top leadership itself formulate and drive through an economic policy initiative. This will occur when the policy issue has key strategic political or economic significance. This has been the case in the energy sector in recent years,[108] as will be explained below.

Economic policy implementation in China is plagued by the same structures and processes as policy formulation. Bargaining continues throughout implementation, and the lower levels of government have great scope for distortion or non-implementation of policies.[109] Divisions amongst the top leaders, a lack of clarity in the policy documents, or the appearance that the policy initiative is not a high priority can each contribute to a failure to implement even if a 'consensus' has been reached in the first place.[110] The corollary of relying on consensus, combined with the progressive delegation of power

107 Shirk (1992).
108 Constantin (2007).
109 Lampton (1992).
110 Lieberthal (1995, p. 164-166).

to the regions, is that any radical initiative imposed by the Center without due process is liable to encounter substantial obstruction and non-compliance. As a result the challenges facing China's central government when implementing economic policy are just as great, if not more daunting, than those involved in the formulation of policy.

The main consequence of the prevailing political processes for policymaking and implementation in China is that a high degree of unpredictability exists in the government's pursuit of economic and industrial goals. This unpredictability is experienced not just by outsiders who lack access to the political elite but also by those charged with formulating and implementing the policy, and relates not just to the degree with which objectives are achieved but also to unexpected and undesirable side-effects.[111] In the energy sector, such unintended consequences can take the form of environmental damage, social cost or direct economic cost through wasteful management, as will be examined below.

In democratic countries that have a strong rule of law, the legal system forms a key component of policy implementation as it provides a framework for both private and public parties to challenge abuses of the law. As a result, a certain degree of consistency and predictability in the implementation of economic policy should emerge in time. Such a framework is not well developed in China.

The legal system

The approach to law throughout the more than two thousand years of Imperial China arose from an amalgamation of ideas from two schools of thought, Confucian and Legalist. The result was a highly structured system of law-making, laws, regulations and courts which was directed at promoting and protecting the interests of the state. The law provided no formal constraints on the ruler and no protection for the individual. Indeed the legal system viewed the family as the basic unit of society, not the individual. No separation of powers

111 Howell (2006).

existed and the legal system was seen as a political tool and as an administrative device to be managed by the government bureaucracy. Punishments were intended to be harsh, yet the nature and level of punishment depended on the status of the individual; the higher the status the milder the punishment. Citizens could gain access to the law, but this was not the prime objective of the legal system. Indeed, and possibly because of this, citizens preferred private ordering of disputes rather than submitting to the courts.[112] Such a system of law is consistent with Chinese culture favoring a society that is highly stratified and which places little emphasis on the role of the individual.[113]

The last years of the Qing dynasty, at the dawn of the 20th century, saw the start of an attempt to reform the legal system and to adopt attributes of systems from Europe, especially Germany, and from Japan. These efforts were halted by the Nationalists who preferred a more traditional approach whereby the role of law was to maintain social stability. The first thirty years of Communist rule from 1949 was characterized by an almost complete lack of interest in the law, and in the abandonment both of the Nationalist approach and of attempts to import features from the developed economies.[114]

Since economic reforms started in the late 1970s, the government has made great strides to draft new laws and regulations, to create a new cadre of professional lawyers and judges, and to spread understanding of the importance of the law. In pushing forward these reforms, the government has drawn extensively on international examples, especially in the realm of economic law.[115] Constraints to the pace and development of legal reform include the close relationship between the courts and both the Communist Party and local government, for courts are directly responsible to the government at the level at which they operate.[116] More fundamentally, the

112 Peerenboom (2002, p. 27-43); Chen (1999, p. 6-17).
113 Licht *et al* (2007).
114 Peerenboom (2002, p. 43-46); Chen (1999, p. 23-39).
115 See for example: Chen (1999); Peerenboom (2002); Jones (2003); Zhu (2004); Clarke (2007a).
116 Zhu (2004); Clarke (2007b); Liebman (2007); Lam (2009).

overall approach to the law continues to bear a striking resemblance to that of Imperial times: that is to say that the law is seen as an instrument of government, or even Party, policy, to be used to retain power, maintain social order and promote economic development.[117] Further, a great deal of social learning is required for citizens to fully appreciate the role of law in a society subject to the rule of law, and this is unlikely to come quickly in a culture dominated by hierarchy and social conformity. Indeed, it can be argued that the rule of law is less necessary in a collective culture than in an individualistic culture.[118]

In terms of the role of law in economic activity, two important features deserve emphasizing. First, the law in China is notorious for failing to provide secure property rights. Rights are poorly defined in law, and government agencies at all levels of government exercise their 'right' to transfer rights with little due process. Within this context, many enterprises appear to have been very successful at enhancing the protecting of their property rights through the building of networks and the use of *guanxi*, involving both public and private sectors.[119] Second, citizens, enterprises and public agencies continue to prefer to settle civil disputes through private ordering rather than going through the court system.[120]

Application to the governance of China's energy sector

The preceding two sections have outlined selected characteristics of China's embedded institutions and of the institutional environment that have relevance to the governance of the energy sector. This section applies these findings to the energy sector with the aim of identifying and explaining the major factors that govern behavior and drive or constrain change in China's energy sector.

This analysis does not intend to be comprehensive in the sense that it applies *all* the considerations examined above to

117 Peerenboom (2002, p. 80-83).
118 Licht *et al* (2007); Greif (2006, p. 294-295).
119 Krug and Hendrischke (2008); Wank (1999).
120 Peerenboom (2007, p. 197).

all facets of the energy sector. Rather, this account will focus on certain general features of China's energy sector in order to apply selected elements of the preceding analysis to a number of examples from different parts of the energy sector. The features to be examined are policy agenda-setting, new ideas and slogans, wider constraints, governance structures, policy-making and policy implementation.

What has driven energy up the political agenda in China?

Despite the importance of energy to a modern economy and to daily life, the sector is rarely at the top of the policy agenda for national governments for long periods of time. Exceptions are those countries which are major exporters of energy and are highly dependent on revenues from these exports to support national development. In other countries, energy supply is commonly taken for granted, and the government devotes its attention to other economic or political objectives which are considered to be more important at the time.

It takes a crisis, an impending crisis or an apparent crisis to bring energy to the attention of most governments. Such crises tend to take the form of events or sudden changes of trend which in themselves create a threat, enhance an existing threat, or create or enhance the intensity with which a threat is perceived. They include an increased probability of the threatened event materializing, an increased scale of impact from such an event, or a reduced ability to react to the threat should it materialize.[121]

Most commonly it is a threat to security of supply which brings energy onto the government agenda. The source of the threat may be domestic or international. In the case of China, it is both. Increasing dependence on imported oil since 1993 and high international oil prices between 2003 and 2008 pushed oil steadily up the government's agenda. But the continued ability of the international markets to supply these imports and of the country to pay for them had the consequence that this increasing vulnerability did not bring oil to the *top* of the agenda.

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121 For a discussion on how such changes have affected thinking on energy policy, see Helm (2007).

In contrast, the realization by China's government in 2004 that the country faced a major shortfall in *domestic* energy supplies, particularly of electricity, brought energy security to the top of the agenda. Immediate and radical action was needed to ensure that the economy and people's livelihoods were not seriously damaged by a shortfall in energy. Attention switched from the production of energy to its consumption, and to the challenge of reducing waste in all parts of the energy supply chain.[122]

The new importance attached to energy security by China's government was enhanced by renewed worldwide concern during the first decade of the 21st century about the future availability of energy supplies.[123] This concern comprised three factors. The first derived from the perception that the level of investment in new oil and gas supply capacity in major exporting countries was inadequate to meet medium-term demand. The second was a resurgence of the belief, widely held in the 1970s and early 1980s, that primary energy resources were close to depletion. Thirdly, the early years of the century demonstrated that the liberalization of electricity markets had created a range of systematic risks which had not been adequately addressed.

Two further issues have brought energy up the agenda around the world. The most prominent of these relates to the environment and, particularly, to global warming. In China, the negative environmental impacts of the country's dependence on coal have long been recognized by the Chinese government. Though action has and continues to be taken to constrain these impacts, environmental concerns alone have not been sufficient to raise energy up the government agenda. Indeed, even the recently enhanced enthusiasm for addressing climate change builds mainly on the energy-efficiency programmes which themselves are driven by security-of-supply objectives.[124] A further driver for integrating climate-change issues into energy policy has been the government's fear of a

122 Andrews-Speed (2009a).
123 See for example: Kalicki and Goldwyn (2005); Barton *et al* (2004); Dannreuther (2007, p. 79-99).
124 Niederberger *et al* (2006); Meidan *et al* (2009).

loss of international reputation should it be seen not to be actively addressing these challenges.

The second issue relates to the need in developing counties to supply inhabitants with modern and clean supplies of energy. China has achieved remarkable success in this respect, for less than 2% of the population now lack access to electricity. As a result, the physical supply of modern energy to all segments of the population is not now a major policy concern, though the appropriate pricing of this energy remains an important priority.[125]

New ideas and slogans in China's energy sector

Against a background of long-held beliefs and socialist values, a number of new ideas relevant to energy and natural-resources policy started to enter the thinking of the Chinese government in the 1980s. Whilst they have not caused the abandonment of the earlier beliefs, they have variously created tensions in the processes of policymaking or implementation or have caused adaptations to existing policy. Not surprisingly, most of these new ideas have their source either in the growing internationalization of the country or in its rising wealth.

The first idea of direct relevance to the energy sector entered into the thinking of China's government during the 1990s through the World Bank and other providers of economic advice. The belief that market forces could and should be introduced to the domestic energy sector, even to electrical power, was still relatively new even in the West, and became part of the tide of advice flowing to China.[126] Zhu Rongji in his position as the head of the State Economic and Trade Commission and later as prime minister was a supporter of this approach. As a result, steps were taken during the 1990s and into the early 2000s to restructure the energy industry, to reduce the extent of government intervention in operational management, and to start to introduce market forces to the energy sector.[127]

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125 Andrews-Speed (2009b).
126 World Bank (1994); Shao *et al* (1997); Berrah *et al* (2001).
127 Andrews-Speed (2004).

These steps towards liberalization were constrained by the government's desire to retain ownership and control over key sectors of the economy, such as energy. Thus government, at both central and provincial levels, maintains majority ownership and control over most large energy companies in China, despite steps to commercialize and to list these companies on domestic and international stock exchanges.[128] In this way the 'old ideas' have constrained the implementation of the 'new'. Given the recent shortages of energy in China and the dubious experiences of energy markets in other countries, this cautious approach is almost certainly appropriate at this stage of China's development.[129]

An idea that has been embraced with greater enthusiasm has been the need for international economic engagement. Again, this was pushed by Zhu Rongji, and China's accession to WTO is emblematic of his achievement.[130] However, its application to energy has been pursued with more selectivity than in other sectors of the economy. Foreign investment in China's energy sector remains difficult and at a low level, including in the wholesale and retail of oil products which have been newly opened under the WTO accession agreement. Long-standing obstacles include policy and legal ambiguity, the market power of incumbents and the pricing systems for oil products and electricity.[131]

China has pursued international energy engagement in a number of fields. These relate to overseas investment by state-owned energy companies, the increasing import of energy products, bilateral energy diplomacy with energy exporters, and active participation in international organizations relating to energy.[132] To a great extent this engagement has been driven by the country's growing dependence on external supplies of oil and, to a lesser extent, of natural gas. Thus the power of necessity has overwhelmed the power of old ideas of self-

128 Andrews-Speed and Cao (2005).
129 Andrews-Speed (2009b).
130 Lardy (2002).
131 Andrews-Speed (2004); Andrews-Speed (2009b); Wang (1999); International Energy Agency (2009a, p. 40).
132 Andrews-Speed *et al* (2002); Lieberthal and Herberg (2006); Ma and Andrews-Speed (2006); Downs (2000); Mitchell and Lahn (2007).

reliance and isolation in the field of energy, in the face of the overriding priority placed on economic growth.

Two sets of ideas specifically relating to energy which have been prevailing around the world have had an impact in China to different degrees. As mentioned in the previous section, the resurgence of the fear of an imminent depletion of certain energy resources has found resonance with the government, and has underpinned its support for overseas investment by national oil companies as well as the growing scope of its energy diplomacy. In contrast, the prerogative to protect the environment, both locally and globally, was not initially embraced by government with the same enthusiasm. Rather, such concerns appear to have been subordinated to the need to maximize economic growth.

Nevertheless, the 1990s and first decade of the 21st century have seen the government show a greater willingness to recognize the environmental challenges created by thirty years of rapid and poorly regulated economic growth, and a growing willingness to invest political and economic capital in addressing these challenges. This trend has been exemplified by the emergence of new political slogans such as the "conservation society" and "scientific development".[133] Despite these efforts and the elevation of the State Environmental Protection Agency to ministerial status in 2008, many fundamental deficiencies lie at the heart of China's systems for regulating the environment.[134]

Switching our attention to Chinese society, especially to urban middle-class society, the acceptance of and respect for austerity would seem to be disappearing.[135] It has been replaced by a wasteful materialism which does not yet appear to be tempered by consideration of the wider impacts of this behavior on the environment. Certainly, the last two decades have seen a growth of environmental awareness across society of the extent of and the consequences of damage to the environment, one of the symptoms of which has been the

133 Constantin (2007); Hallding *et al* (2009).
134 Ferris and Zhang (2005); Economy (2004, p. 91-128); Ma and Ortolano (2000, p. 115-131).
135 Goodman (1999); Smil (2004, p. 144); Rosen (2004).

expansion in numbers and degree of activism of domestic environmental NGOs.[136]

Yet China has yet to experience the rebellious, environmentally conscious, "back-to-nature" movements which swept through Europe and North America in the 1960s and 1970s, and which, despite their eccentricities, provided an important impetus for the development of today's appreciation of global warming and other environmental threats. Instead, the growing middle classes in China, as in many countries today, enjoy and expect plentiful energy supplies at low prices. Though they may have some appreciation of or concern for the longer-term costs in terms of security of supply and environmental damage, their perception of the importance of the environment and their willingness to adapt their behavior voluntarily appear to be limited.[137]

To a great extent the development of these attitudes may have been caused directly by government propaganda which for thirty years has placed greater emphasis on economic growth than on almost any other socio-economic parameter. However, some evidence exists that a significant proportion of Chinese university students are indeed aware of the environmental and energy challenges facing China and are willing to take certain steps in their own lives to address these challenges.[138]

The wider constraints on energy policy

New ideas cannot easily be translated into new policies. Not only is this process constrained by the older values and beliefs, but the formulation of a realistic new energy policy is constrained by the nature of the energy sector itself and by its links to all aspects of the national economy. As a result, the making of energy policy takes place within a tightly defined framework that rarely allows for sudden and radical shifts; or if such shifts are made, then the costs and risks will be high.

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136 Economy (2004, p. 129-175); Gough (2004); Thompson and Lu (2006).
137 Lee (2005).
138 Lee (2005); Zweig and Ye (2008).

The most immutable aspects of a country's energy sector are the scale, nature and geographic distribution of its primary energy resources. In the case of China, these comprise an abundance of coal resources and only modest oil and gas resources, which mainly lie in the north of the country, far from the current centers of economic activity in the south and east. Though efforts have been made to encourage the diffusion of economic activity to the west and north (for example, through the Develop the West Strategy), and to develop new and renewable forms of energy, the country is condemned for the foreseeable future to rely on an essentially inefficient and dirty fuel (coal) and to need to transport energy over long distances.[139]

Investment in new infrastructure to produce, transform and transport energy has continued at a prodigious and accelerating rate. For example, power generation capacity doubled from 357 GW to 713 GW over the period 2002 to 2007, and some 90% of this growth was in coal-fired plants.[140] Investment in rail networks to transport coal, in electricity transmission lines and in oil and gas pipelines has also been massive.[141] Though such investment is clearly necessary to supply the energy required to support economic growth, the nature of this investment is such that it perpetuates and 'locks in' the country to the existing system of energy supply. Given how much of China's energy infrastructure is relatively new and given that its working life should be in the order of decades, these recent investments provide a tight constraint on future government energy policy.[142]

Likewise, at the other end of the energy supply chain, the nature, the energy properties and the location of new factories and of civil, commercial and residential buildings will play a strong role in determining the scale and nature of energy demand for many years.[143]

Energy is linked to almost every sector of the economy. The manner in and rate at which energy is consumed is

139 Andrews-Speed (2004); Berrah *et al* (2007).
140 Andrews-Speed (2009b).
141 International Energy Agency (2007, p. 317-361).
142 Wang and Watson (2009).
143 Rosen and Houser (2007); Andrews-Speed (2009a).

dependent on the size, rate of growth and structure of the national economy, and on the state of technology applied in the consumption of energy in the industrial, commercial and household sectors. The manner in which investment is made in energy production and consumption varies according to the way in which finance is made available (for example, through banks or directly from the government) and according to the systems for pricing energy products, commodities and manufactured goods. In turn, the pricing of energy is itself linked to the nature of the social-welfare systems, for if these systems are not well developed it may be essential to use energy subsidies as an instrument for poverty alleviation. If energy is imported or exported, this energy trade is likely to be supported by actions in the field of diplomacy and security.

As a consequence, energy policy is intimately linked with many other national policies. In the case of China, the desire for a sustained high rate of growth, continuing investment in heavy industry and infrastructure, and the drive to maximize exports have all contributed to the size and structure of demand for energy, and constrain the scope for changes in energy policy.[144] The industrial policy of retaining majority state ownership over large energy companies and promoting their internationalization plays an important role in both the way in which the domestic energy industry is structured and operated, and the manner of overseas investment by these companies.

China's social policies have played a key role in determining the high degree of availability of energy across society, and at relatively low prices for most users. The same attitude to promoting social welfare accounts for the government's keenness to maximize employment in the few remaining large state-owned enterprises, of which the energy companies are key examples. This concern played a significant role in the way in which the oil companies were restructured in 1998. The productive and potentially profitable assets were collected into the commercialized entities which were later listed on international stock markets. The service enterprises were kept in the

144 Rosen and Houser (2007); Andrews-Speed (2009a).

non-listed, wholly state-owned holding companies. These service companies were able to retain large numbers of employees by continuing their operations in China and by rapidly expanding their activities overseas, both in support of the investments made by the national oil companies and on their own account.[145]

Transport policy has a direct relationship to energy policy in any country. In the case of China, the argument for an energy-efficient and environmentally friendly transport policy seems to have been subsumed beneath an industrial policy which has championed automobile manufacturing, an urban design policy which has favored multilane highways as the main transport network, and a social policy which, intentionally or otherwise, has highlighted car ownership as a legitimate expectation of the urban middle classes.[146] Only belatedly have a small number of Chinese cities started to invest substantially in modern mass transport systems such as metro and light rail. Indeed, the abundance of cheap taxis in the cities has created a further class of citizen requiring protection from rising oil prices: the taxi drivers.[147]

Energy policy may also be subservient to monetary, exchange rate and fiscal policies. Energy is one of the few items the price of which remains, to a greater or lesser extent, under the control of China's government.[148] Thus in times of rising inflation, such as in 2007 and 2008, the government will tend to use energy prices as an instrument to constrain inflation, holding prices down rather than letting them rise along with international energy prices. China's exchange-rate policy has been predicated on the perceived need to maximize exports of manufactured goods, and thus the government has artificially restrained the rise of the Yuan against the American dollar by buying dollars.[149] This has had the effect of encouraging the export not only of manufactured goods but also of energy-intensive materials such as steel, plate glass and cement.

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145 Andrews-Speed (2004, p. 169-183).
146 Nolan (2001, p. 501-585); Gallagher (2006); World Bank (2007, p. 15-20); Parkash (2008, p. 33).
147 Andrews-Speed (2009a).
148 Andrews-Speed (2004); Andrews-Speed (2009a).
149 Naughton (2007, p. 389); Brammall (2009, p. 371).

The volume of such exports has been further stimulated by tax rebates.[150] Indeed, this policy results in exports accounting for as much as one-third of Chinese energy consumption and carbon-dioxide emissions.[151]

Governance structures at central government level

The importance of the energy sector elevates key policy initiatives or decisions to the very apex of power in China's government, as it does in most countries. Here the State Council lies at the top of the government structure. Its membership is very similar to that of the other key institution, the Politburo, which oversees the running of the Communist Party of China.[152] Such was the importance of oil to China in the 1960s and 1970s that members of the 'petroleum clique', who were drawn from the oil industry, played a crucial role in China's economic policymaking at that time.[153] Alongside the State Council and the Politburo, and yet distinctly subordinate, the National People's Congress forms the legislature. Despite the strong concentration of power in these bodies, below this level authority over the energy sector is highly diffuse.

China's energy sector has long been characterized by a lack of a strong and well-resourced agency at central government level. During the 1980s and beforehand, each individual energy industry (coal, power, petroleum, petrochemicals) was itself a ministry within government. Each reported to the State Planning Commission (SPC) and the State Council. Other than the SPC, which coordinated all economic activities in the country, no other agency existed to develop a coherent policy for the energy sector. As a result, energy policy consisted mainly of the summation of the individual industry plans.[154]

The Ministries for Petroleum and for Petrochemical Industries were abolished in the 1980s, and replaced by two corporations, CNPC and Sinopec respectively.[155] A Ministry of

150 Rosen and Houser (2007).
151 Weber *et al* (2008).
152 Lieberthal (1995, p. 159-163); Andrews-Speed *et al* (2002, p. 47).
153 Liao (2006, p. 201-205); Lieberthal and Oksenberg (1988).
154 Lieberthal and Oksenberg (1988); Andrews-Speed (2004).
155 Kambara and Howe (2007, p. 46, 97).

Energy was created in 1988 to oversee these companies and the remaining Ministries for Coal and Electrical Power. But the new Ministry of Energy lacked the status, the authority and the resources to impose itself on the individual industries, and was itself abolished in 1993.[156]

This disaggregated structure persisted through the reforms of 1998. At that time, the Ministries for Coal and Electrical Power were abolished, and replaced by provincial-level coal companies and by a State Power Corporation respectively. The State Economic and Trade Commission (SETC) took responsibility for overseeing the operations of the state-owned energy companies, whilst the newly renamed State Development and Planning Commission (SDPC) retained authority over medium and long-term plans, pricing and energy efficiency.[157]

With authority split between these two high-level commissions, the degree of coherence in energy policymaking deteriorated rather than increased, not least because of bureaucratic competition. One symptom was the progressive decline of central government control over the energy sector, which was highlighted by the energy crisis which faced the new government in 2003.[158]

Two key priorities for the government at this time were to regain and centralize control over the energy sector and to provide for more coherent policymaking. Three institutions were established in order to achieve these objectives. The Energy Bureau was created within the National Development and Reform Commission (NDRC) which replaced the SDPC in March 2003. This brought together many, but not all, of the energy functions which had been scattered across the previous SDPC and SETC, the latter having now been abolished. The functions of the Energy Bureau included formulating policy and drawing up plans for sector reform, as well as routine oversight of the country's energy sector.[159] It soon became clear that this small bureau, with a staff of less than thirty, could not possibly fulfill its mandate. Two years later, in 2005,

156 Andrews-Speed (2004); Downs (2006).
157 Andrews-Speed (2004).
158 Downs (2006); Meidan et al (2009).
159 Downs (2006).

the government set up an Energy Leading Group within the State Council, supported by a State Energy Office. Their role was to set strategic directions and to improve policy coordination.[160]

The ten years of government restructuring since the mid-1990s, rather than improving governance, had led to a progressive loss of control by central government and a decline in the quality of governance within the energy sector.[161] In the build-up to the plenary session of the National People's Congress in March 2008, it was anticipated that a new and powerful energy agency would be established. This did not happen. Instead the reforms to those agencies managing the energy sector were rather modest in comparison with reforms to other parts of government. The existing Energy Bureau was renamed the National Energy Administration, and a National Energy Commission was created from the pre-existing National Energy Leading Group.[162]

The National Energy Commission retained the overall roles of coordinating energy policy and setting strategic direction that were previously held by the Leading Group. Meanwhile, the National Energy Administration took on the functions of the former Office of the Energy Leading Group, the NDRC's Energy Bureau and Department for Energy Efficiency, and the former China Commission of Science, Technology and Industry for National Defense (COSTIND). Its functions were to develop energy strategy, to draft plans and policies, to make proposals for energy industry reform, to oversee the country's oil, natural gas, coal and power industries, to manage the strategic oil reserves, to formulate policies for renewable energy and energy conservation, and to carry out international energy cooperation. The responsibility for energy pricing remained with the NDRC's Department of Price Administration. The level of staffing was set initially at 112.[163]

Other government agencies at or close to ministerial level also continued to have a significant role to play in the energy

160 Downs (2006); Rosen and Houser (2007).
161 Kong (2006).
162 Chen and Graham-Harrison (2008); Zheng and Wang (2008).
163 Wang (2008); Downs (2008).

sector. The Ministry of Land and Resources continued to manage resource extraction and exploitation, and the environmental protection of the land. The State Environmental Protection Agency, recently elevated to ministerial status as the Ministry for Environmental Protection, was responsible for controlling the pollution of air and water. The State Asset Supervision and Administration Commission took the ownership role for government over the large state-owned enterprises. In addition the Ministries of Science and Technology; Commerce; Foreign Affairs; Finance; Transport; Railways; and Housing and Urban-Rural Development all retained roles in the energy sector.[164]

Each ministerial organization has the authority to issue regulations relating to its sphere of activity. Of these the most powerful in the energy sector is the NDRC which, as the successor of the State Planning Commission, has nation-wide and sector-wide responsibility. Above all these ministerial organizations sit the three key bodies in which the top leadership of the country is represented, as described above: the State Council, the Politburo and the National People's Congress. The military also have a role to play in energy policy formulation, but this is probably rather limited.[165]

The main consequence of the last twenty years of restructuring is that the country still lacks a well-staffed and authoritative agency with overall responsibility for the making and implementation of energy policy.

Energy policymaking

The fragmented nature of the governance structures in the central government combined with other features of economic policymaking described above contribute to a number of weaknesses in China's energy policymaking; for example: a lack of leadership over the energy sector; the disproportionately high degree of influence over policymaking held by state-owned energy companies; a delight in the use of ambitious targets; and the prevalence of bargaining in policymaking which

164 Meidan *et al* (2009).
165 Andrews-Speed *et al* (2002, p. 49); Downs (2004).

results in policy outputs which may be unsuited to the challenges they are intended to address.

As described above, China's energy sector has consistently lacked a well-staffed and authoritative agency to formulate and implement energy policy, and to provide overall leadership of the energy sector. Instead the structure of government led to policy proposals related to energy arising from individual line ministries or, latterly, state enterprises. These individual entities would champion their own proposals, which might take the form of targets for five-year plans, laws and regulations covering their specific activities or ideas for industry restructuring or price reform. In cases where these policy proposals were limited to the specific industry or activity, the proposal might be accepted and implemented with little obstruction from other parties. In this way energy policy and plans for the energy sector tended to resemble a summation of individual industry strategies and targets which together might be inconsistent or even contradictory, rather than a coherent package of policies designed to address the wider energy, economic and environmental challenges facing the country.[166] The restructuring of government agencies in 2008 does not appear to be sufficiently profound to effect any great change in these patterns.[167]

The prime examples of this fragmented policy environment are the five-year plans for energy which continue to be characterized by specific targets for each component of the energy industry, but by only vague statements relating to measures and mechanisms that would apply across the energy sector and provide some coherence. Formal laws and regulations show the same features.[168] Laws and regulations applying to a single activity, such as township and village coal-mines, emanate from a number of different sources and tend to be inconsistent and contradictory.[169]

Disjointed policy is also exhibited by the contrasting approaches to pricing for crude oil and coal, on the one hand,

166 Andrews-Speed (2004); Kong (2006); Downs (2006).
167 Downs (2008).
168 Andrews-Speed (2004).
169 Andrews-Speed (2004).

and for electricity supply and oil products, on the other. These fundamental pricing discontinuities continue to cause major difficulties in a progressively commercialized energy sector.[170] Indeed, these discontinuities are an important source of instability in China's domestic energy markets. Not only is such instability typical of what transaction-cost economics would consider to be a hybrid governance structure – that is to say, a mix of government control and the market – but these discontinuities become sources of 'friction' which should trigger policy change.[171] But to date the government has failed to take steps to eliminate these discontinuities.

The period of restructuring of the energy industry in the mid and late 1990s saw a number of occasions in which the newly commercialized state energy enterprises were able to influence government policy to their direct advantage. In both the coal and oil industries, the interests of the major state-owned enterprises were potentially threatened by smaller enterprises. In the coal sector, the large mines, in which the state had invested billions of Yuan, were threatened by the township and village coal-mines in 1998. At that time, demand for coal exceeded supply and the smaller mines with their lower operational standards and lower costs were able to undercut the larger mines in the market. The ensuing campaign to close the township and village mines was ostensibly driven by concerns for safety and the environment, but the timing of the campaign was decided by the short-term need to protect the interests of the larger mines.[172] Thus, when demand picked up again, output from the smaller mines was allowed to grow again, until a further campaign to close them was launched in 2004.[173]

In a similar manner, the restructuring of the petroleum industry in 1998, far from leading to an enhancement of competition, resulted in the further consolidation of the market position of the newly commercialized companies, PetroChina and Sinopec, as the government enforced their take-over of a

170 Kong (2006); Wang (2007); Andrews-Speed (2008a).
171 Williamson (2000); Lieberman (2002).
172 Andrews-Speed (2004).
173 Andrews-Speed (2007).

large number of local wholesalers and retailers in the late 1990s.[174] Since that time the national oil companies (NOCs) have extended their influence over petroleum policy from the domestic into the international sphere, for it can be convincingly argued that it is the NOCs that drive China's international energy agenda rather than the government.[175] In the electricity sector, the dominant state-owned companies have also been successful in maintaining high barriers to new market entrants as part of a strategy to maximize their financial returns.[176]

This fragmentation of policy was further aggravated by the tendency of the top leadership to issue edicts or launch campaigns directed at a specific activity or industry, without apparent consideration for the wider or longer-term consequences or requirements of these policy actions. Two recent examples concern the construction of power stations and of the West-to-East gas pipeline. The year 1998, as mentioned above, was characterized by an oversupply of energy, and this affected the electrical power industry. Partly in response to this, the central government banned the construction of large new power stations from 1999 in order to prevent over-investment and a waste of resources. This edict created the background for the nationwide power shortages which emerged from 2003 once economic growth picked up again and which lasted through 2008.[177]

The decision to build the West-to-East gas pipeline from Xinjiang to Shanghai was made in a relatively short period in 2001. The decision was driven by the wider Develop the West programme which was being formulated in order to enhance the economic development of western China and by the recent discovery of significant gas reserves. Though the decision to press ahead with construction of the pipeline may have been justifiable in this context, it was made in the absence of a wider policy for natural gas.[178] Indeed, such a policy was only

174 Ma (2008).
175 Ma and Andrews-Speed (2006); Downs (2006); Houser (2008); Kong (2009).
176 Cheng and Tsai (2009).
177 Kong (2006); Andrews-Speed (2009b).
178 Andrews-Speed (2004).

formulated and published in 2007.[179] Investors in the pipeline and in gas-using infrastructure had no policy framework to guide their investments. As a consequence, all the foreign companies invited to participate in the pipeline project withdrew, and, at the other end of the supply chain, gas-fired power stations were built by Chinese energy companies that, even in 2008, were receiving no gas supply.

Further, as a relic of the Mao era, individual industries in the past appeared to revel in setting themselves extremely ambitious targets and deadlines, most of which were quite unachievable. For example, in the late 1970s the government set long-term production targets for the oil and coal industries for the year 2000 of 200 million tonnes and 2,000 million tonnes, representing a doubling and trebling of output respectively.[180] The target for oil was missed by a long way, but, thanks to soaring demand and massive investment, the coal target was met in 2005. Recent commercialization has dampened this tendency for setting ambitious targets for individual industries. However, the government in 2004 was bold enough to set the objective of reducing energy intensity by 20% between 2006 and 2010. This target has been achieved, but it took enormous effort on the part of the central government and some contributions to meeting that quantitative target may not be sustainable.[181]

In the case where initiatives had wider ramifications, the policy proposals would be subject to bargaining between the various parties and would tend to result in final policies that resulted from a consensus. In such consensus-building, a single entity could protect its interests by vetoing a proposal that threatened its vital interests, and thus reform measures intended to produce radical change would be substantially diluted or even stalled completely.

Whilst internal debate and bargaining are characteristics of government decision-making in most political regimes, the structure and nature of China's energy sector has granted considerable bargaining and veto power to the individual

179 National Development Reform Commission (2007).
180 Smil (1981); Kambara and Howe (2007, p. 33).
181 Andrews-Speed (2009a).

ministries and state enterprises.[182] In recent years, efforts to make substantial changes to the energy sector have foundered, with the end result variously being a compromise, a step of little significance, or a further postponement of the decision. Examples are numerous, and all relate to key aspects of the energy sector.

The 1998 reforms to the petroleum industry were initially intended to create five or more oil companies that would compete with each other in the domestic market, in the same way as the State Power Corporation was later broken up in 2002. Instead, CNPC and Sinopec just underwent an asset swap and retained their *de facto* duopoly over the domestic markets.183

The introduction of a consumer tax, or rather a significant increase of existing taxes on oil products such as gasoline and diesel, has been debated in the National People's Congress since the early 1990s. The aims of the tax were said to be to encourage energy saving, to promote stability in the oil sector, and to assist economic reform. The move was consistently blocked by delegates of the National People's Congress concerned about the impact of this tax on the poorer members of Chinese society. Fuel tax was eventually increased on 1st January 2009, at a time which allowed the government to take advantage of relatively low international oil prices.[184]

A final example concerns the draft Energy Law. The idea of creating an Energy Law came firmly on to the government agenda in 2005 as part of the leadership's drive to constrain energy use and improve the management of the energy sector. Four years later, in 2009, the law was still under discussion. The draft itself covers all conceivable aspects of energy production and consumption. It is so ambiguous or self-contradictory on the key points, such as ownership, pricing and access to infrastructure, that it would not appear to be of much value as a tool for charting the future development of the energy sector. The end result of extensive bargaining and compromise is

182 Constantin (2007).
183 Andrews-Speed (2004).
184 Wang (1999, p. 12, 223); Downs (2006); Andrews-Speed (2009c).

likely to be a document that fails to achieve its intended objective of providing a clear framework for the future development of the nation's energy sector.[185] We will know more as the 12th Five-Year Plan is translated into implementing text and legislation.

Policy implementation

The implementation of a policy can fail for a number of reasons: the concept behind policy itself may be inappropriate or misguided, and, in particular, it may fail to take into account other major policies or certain circumstances which lie in contradiction to the new policy; the details of the policy may have been inadequately thought through before implementation; the consultation during policymaking may have been insufficient to win the support of all key parties; the systems and resources to support policy implementation may be inadequate; or circumstances may change to render the new policy irrelevant.[186]

Energy policy in China suffers from various combinations of these deficiencies. The most prominent derives from active resistance from local governments. This resistance has two sources. First, local governments, even provincial governments, are generally not formally involved in the formulation of national policy, or only marginally. They may push for national policy changes or they may be recipients of national policy, but except if the policy goes through the National People's Congress, representatives from lower levels of government do not formally draft national laws and policies nor do they have the chance to debate them in an open forum. Second, in the case of energy, natural resources and the environment, the interests of local governments are often diametrically opposed to policy initiatives from the central government. The latter seek to ensure long-term management of energy, natural resources and the environment, whilst the local governments tend to be focused on short-term economic growth. The implementation of national policy is further constrained by the fact

185 Andrews-Speed (2008b); Kong (2009).
186 Hogwood and Gunn (1984); Parsons (1995).

that the local bureaux of the ministries report to and are paid by the local governments and not by the central government.[187]

Poor implementation at local level is intensified by the involvement of local officials in the very businesses they should be regulating, by a shortage of trained staff in certain areas, by the low level of penalties for certain offenses, and by rent-seeking and corruption. Further, the immaturity of the legal system has the effect of protecting local state-owned enterprises, local governments and even local private businessmen from prosecution by private parties. These obstacles to policy implementation are exacerbated by the clientilism, *guanxi* and networks which characterize parts of China's economy.

As a result, any measures introduced by the central government that have the effect of reducing local economic activity will be resisted by local governments and enterprises unless the central government applies what would appear to be a disproportionate effort to enforce the new measures, in the form of a campaign.

Nowhere is this better illustrated in the energy sector than by the repeated campaigns to close the township and village coal-mines. In the mid-1990s these mines produced almost half of the country's requirement for coal and contributed greatly to local wealth-creation in the mining areas, but were characterized by very poor safety and environmental practices. Efforts by the central government to close many of these mines between 1998 and 2002 were met with active resistance, false reporting and feigned compliance. As a consequence the government has run a more rigorous closure campaign since 2005. Though this has met with considerable success, the same local obstacles continue to arise.[188]

Environmental protection remains a longstanding problem in China, not least in the energy sector. Despite extensive environmental legislation and the progressive upgrading of the status and staff of the Environmental Protection Agency to a

187 Economy (2004); Ma and Ortolano (2000); Andrews-Speed (2004).
188 Andrews-Speed (2004); Andrews-Speed and Ma (2008); Wright (2009).

Ministry, a lack of regulatory resource and authority, weak penalties and local resistance continue to ensure that China has some of the world's most polluted skies and rivers.[189]

When the Energy Conservation Law was introduced in 1997, it had almost no impact. A few provinces passed local regulations which were just slightly modified from the national law, but little effort was expended in enforcement.[190] The current nationwide programme to enhance energy efficiency appears to have succeeded in overcoming obstruction at provincial level, but is still meeting resistance from lower levels of government and state-owned enterprise.[191]

The drive to achieve ambitious targets may also have undesirable side-effects in the form of inefficiencies, as has been seen recently in the case of wind power. At the end of 2005, total installed wind-power capacity was about 1 Gigawatt (GW). Since then the rate of growth has been dramatic. Total capacity reached 12 GW by the end of 2008 and China will spend another $75 billion by 2015 in expanding its nuclear fleet. During 2009, China's wind-power capacity took it to fourth in the world, behind the USA, Germany and Spain. In 2007 the target set for the year 2020 was 30 GW. The target for 2015 is 70 GW and might be raised yet again. Two undesirable side-effects of this target-driven culture have been overcapacity in the manufacturing of components as companies seek to expand their market share and a low average generation rate of just 20% for wind farms. This low rate is a consequence of poor siting, unreliable technology and the unwillingness of grid companies to despatch the power. In addition, many wind farms experience long delays in being connected to the grid.[192]

That said, it would be incorrect to assume that all policy initiatives in the field of energy are doomed to fail or to generate undesirable side-effects. This is clearly not the case. One important reason, as discussed above, is the authority of the Communist Party. The Party is all-pervasive, at all levels of government, in state-owned enterprises and also in the private

189 Economy (2004); Ma and Ortolano (2000); Andrews-Speed (2004).
190 Andrews-Speed (2004).
191 Andrews-Speed (2009a).
192 McElroy *et al* (2009).

sector. The Party is the glue that holds the fragmented system together, along with networks of relationships between individual officials and managers.[193] The importance of the Party and of loyalty to national interests is best illustrated by the career progress of officials both in government and in state-owned enterprises. Successful and loyal officials at lower levels of government are promoted to higher levels of government. Thus the top leadership has tended to be drawn from those who were previously governors or Party Secretary Generals of Provinces, or mayors of major municipalities such as Beijing, Shanghai and Tianjin.[194]

Although the most senior leaders tend to emerge from a career in the Party apparatus, in the ministries or in provincial-level government, a number of senior officials from the state-owned energy enterprises have also been promoted to high government positions. Before he became prime minister in 1987, Li Peng had been Minister for Electrical Power. More recently, Zhou Yongkang moved from his position as president of CNPC to be Minister for Land and Resources, then Party Secretary General of Sichuan Province and later Minister for Public Security. Mr Zhou is currently on the Politburo Standing Committee, is a State Councillor and is chairman of the Party Central Political Legislative Committee.[195]

The prospects for promotion to the highest level from all streams of government and state enterprise, combined with the essential requirement to be a Party member to rise through the ranks, ensures that policies critical to the survival of the Party and to the security of the state are likely to be implemented with at least some degree of success. It is because inadequate energy supply is now seen as a serious threat to the economic interests of the country and therefore to the interests of the Party that the government is expending so much effort in implementing the new energy-efficiency policies. It is thus to be expected that many government officials who have long-term political ambitions will seek to implement China's emerging energy policies.

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193 Lieberthal and Oksenberg (1988, p. 151-160); Lieberthal (1995, p. 208-214).
194 Lieberthal (1995, p. 226-230).
195 National Congress of the Communist Party of China (2007, p. 217-219).

Implications for China's energy policy

This chapter has examined how decisions, actions and behaviors in China's energy sector are driven and constrained by critical variables such as the embedded institutions, the institutional environment, the central role of the energy sector, and new ideas. This analysis has demonstrated that the context in which policy is formulated and the processes of policy-making and implementation in China result in the overall national energy policy being characterized by, on the one hand, continuity and path dependency and, on the other, by incremental, short-term adjustments which are often unpredictable in both their nature and their consequences.

In the absence of a major economic or political crisis and of intense and sustained political effort on the part of the government, a sudden and fundamental change in the manner in which the energy sector is managed is most unlikely. Indeed, the same can be said of all industrialized or industrializing countries. Thus the paths of China's energy policy and energy consumption over the coming two decades are relatively predictable within certain bounds, and the most important determinants will be the scale and nature of economic growth. Despite the short-term success of the measures to enhance energy efficiency and the role of renewable energy, achieving significant and sustained impact will require major adjustments to many components of the economy and to the political structures. Setting aside the possibility of major domestic crises, it is to be expected that China's demand for energy will continue to grow, albeit at a rate that gradually declines.

Set against this path-dependency is a tendency for sudden minor changes in policy priorities, objectives and instruments. Many measures are short-term in focus, are reactive in character and are liable to rapid reversal or modification. These features, combined with the difficulties associated with policy implementation, render the path of China's energy policy and the outcomes highly unpredictable in the short term. Further, any unwillingness on the part of the government to keep energy policy at or near the top of the agenda for sustained periods of time will render uncertain even the long-term

impact of major policy initiatives. This has consequences both for those observing energy phenomena within China and those engaged with China's activities overseas.

In addition, the rapid and sustained growth in China's energy demand, taking place in such a policy environment, creates and sustains a number of fundamental tensions and contradictions within the energy sector. For example, the problem of keeping up with the rate of growth of demand and trying to keep each link in the energy supply chain expanding rapidly at the same pace and in a coordinated manner distracts policymakers from longer-term considerations. Secondly, policy proposals generally fail to address in a satisfactory and sustainable way how the fundamental tensions between the requirements of security of supply, of social equity, of economic competitiveness and efficiency, and of environmental protection will be reconciled.

From the international perspective, China's greatest energy policy challenge is to put in place measures which can dramatically constrain and eventually reduce the total level of carbon emissions from its energy sector. A range of pathways has been described recently to show, in principle, how China can achieve levels of emissions by the end of this century that are consistent with global targets. Each pathway depends on different combinations of structures for the economy and for energy supply, and on the application of different economic and policy instruments.[196] Although the introduction of new technologies will undoubtedly have a key role to play in the success of climate-change strategies, the analysis presented in this chapter identifies and elaborates a number of features of China's society, economy and polity which may constrain the implementation of these plans.

The path-dependency of and internal inconsistencies in China's energy policies and institutions are not unique; neither is the failure to react to new challenges in a coherent and sustained manner. The energy crises of the 1970s may have

196 See, for example: Tao and Watson (2009); International Energy Agency (2009); Hallding *et al* (2009); Oberheitmann and Sternfeld (2009).

succeeded in persuading the governments and societies of OECD countries to radically adapt their energy-consumption patterns over just a few years, but many initiatives were reversed after energy prices fell in the mid-1990s.[197]

In recent years, almost without exception, OECD governments have been very slow to adapt their energy policies to address the twin challenges of security of energy supply and climate change. The complexity of the challenges, the costs of policy implementation and an unwillingness to move ahead of the pack have combined to produce a collective paralysis.[198]

That being said, the path of China's energy policy has more impact on the rest of the world than that of any other country, with the exception of the USA. This arises from the scale of its energy sector and of its national oil companies, from the sudden short-term changes in energy and economic policy, and also from the lack of transparency in the policymaking process. These features of scale and unpredictability are exacerbated by the distinct set of ideas, beliefs and traditions that frame the policymaking process.

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197 International Energy Agency (2006, p. 24-25).
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Chapter Two

China's Foreign Energy Policy

Xia Yishan*

Introduction

China's foreign energy policy is formulated on the basis of an evaluation of its domestic energy supply and demand. Overall, China's energy self-sufficiency rate is over 90%, which means the country can basically satisfy its domestic need. But its oil self-sufficiency rate is rather low; more than 50% of its oil supply is imported, and this rate is set to rise. In this context, China has gradually but comprehensively changed its domestic and foreign policy on energy supply. The basic strategy underlying its foreign energy policy is, above all, to establish mutually beneficial cooperation; with mutual benefit as the premise and multiple operations as the means, China will ensure a long-term, stable, economical, clean and safe energy supply for the country, using foreign resources and international markets to meet the needs of its sustainable economic development to ensure the continuous improvement of its people's lives.[1]

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1 "New Eight-Word Rules for Ensuring Energy Supply", *China Petroleum Daily,* April 28, 2010.

Current situation and prospects of China's energy supply and demand

China is one of the largest energy producers and consumers in the world. In terms of the balance between energy production and consumption, it ranks second in the world, with an energy self-sufficiency rate of around 90%. China's oil production rose to the fourth largest in the world in 2009, after Russia, Saudi Arabia and the United States. Its oil consumption ranks second in the world, with its reliance on imported oil just exceeding 50%.[2]

China's energy situation has the following characteristics:

• *Irrational energy consumption structure, with an excessively high proportion of coal consumption*

China's energy situation can be summed up as an "abundance in coal, shortage of oil and scarcity of gas".[3] In 1952, the proportion of coal in total energy consumption reached as high as 95%. With the development of industrialization, urbanization and the improvement of people's living standards, the proportion of coal has dropped gradually. In 2007, it was 69.4%, with 20 % for crude oil, 3.4% for natural gas, and 7.2% for hydro-electric power, nuclear and wind power combined.[4] Despite this, total coal consumption continues to increase.[5] In 2009, coal consumption totaled 3.02 billion tons. By 2020 it will be 3.8 billion tons, while its proportion of primary energy consumption will fall to 57%.[6]

China's energy consumption structure, with coal as the main energy source, has seriously deviated from the mainstream of international energy developments. In developed countries and regions such as the United States and the European Union, the proportion of coal in primary energy

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2 "China's Energy Self-Sufficiency Rate keeps above 90 percent", *People's Daily,* p. 17, September 29, 2009.

3 "Creative Thinking to Select and Set Up Models of Excellence" by Zhao Haijing, *Chinese Petroleum Enterprise*, No. 1-2, 2010.

4 "China Statistics Abstract" 2008, National Bureau of Statistics.

5 "Creative Thinking to Select and Set Up Models of Excellence" by Zhao Haijing, *Chinese Petroleum Enterprise, No. 1-2, 2010.*

6 "China Makes Another Breakthrough in Exploration and Exploitation of Energy Resources" by He Jiao, *China Energy News*, 19 April 2010.

consumption accounts for only about 20% of total final energy consumption. Oil and natural gas account for over 60% in primary energy consumption, and are the major energy resources. China's energy structure has caused serious pollution. Energy consumption contributes 70% of the emission of sulfur dioxide and industrial dust, causing great harm to human health and huge losses in the national economy. Meanwhile, China's aggregate carbon-dioxide emissions already account for 13% of the global total; the country has become the second largest emitter after the United States. However, China has committed itself to sharing international responsibility for reducing greenhouse-gas emissions, tackling climate change, changing its energy consumption structure, and increasing the use of clean energy resources in order to meet the urgent need to safeguard its energy security.

• *Inadequacy in energy reserves seriously hinders the development of energy production*

China boasts abundant energy reserves, but those reserves are dominated by coal, while there is a lack of high-quality oil and natural gas. In the proven recoverable reserves of its conventional energy resources (which include coal, oil, natural gas and hydro-energy), raw coal, crude oil, natural gas and hydro-energy account for 87.4%, 2.8%, 0.3% and 9.5% respectively.[7] According to the *BP World Energy Statistics* of 2006, as of the end of 2005, China's oil and natural gas accounted for 1.3% of the world's total reserves. Given its big population base, China's *per capita* energy resources are much lower than the world average. Even China's *per capita* coal resources are only 50% of the world average, while its oil and natural-gas resources *per capita* are one-tenth and one-twentieth of the world average, respectively. As far as China's oil production is concerned, its crude-oil output will total 177 to 198 million tons by 2010 and 182 to 200 million tons by 2015, which represents a slow increase followed by a gradual decline. The trend for production of natural gas is similar to the trend for oil. In 2009, the output of natural gas was approximately 80 billion cubic meters. From 2010 to 2015 China's natural-gas

7 Ibid.

output will grow by 8.5%, reaching 115 billion cubic meters. Because of high costs and great difficulties in exploiting its domestic natural gas, it is difficult for China to raise its output.

• *Due to a continuous increase in energy demand, the gap between supply and demand is widening*

Given rapid economic growth and accelerated modernization, China's demand for energy keeps increasing. In 1990, total energy consumption was 987 million tons standard coal; in 2000 it was 1.38 billion tons – an increase of 400 million tons in just 10 years. In 2009, total Chinese energy consumption amounted to 3.1 billion tons, an increase of 720 million tons over nine years, with an average increase of 80 million tons annually. It is predicted that, by 2020, total energy consumption will total 4.5 billion tons of standard coal, an increase of 1.4 billion tons in 11 years, with an average annual increase of 127 million tons.[8] These statistics show that China's energy demand has been increasing year by year at a rapid rate.

China's demand for all sorts of energy resources such as oil, natural gas, new and renewable energy, and coal is increasing, to varying degrees. The increase in demand for oil and natural gas is the fastest. Demand for oil has been rising very quickly in the past decade – from 227 million tons in 2001 to 388 million tons in 2009, a rise of 161 million tons over eight years, with an annual increase of 20 million tons.[9] Demand for natural gas increased from 27.4 billion cubic meters in 2001 to 67.3 billion cubic meters in 2007, and to 85 billion cubic meters in 2009, an increase of 57.6 billion cubic meters over eight years.[10] Demand for oil and natural gas in the future will also increase rapidly, with a rapid increase in this demand in the next decade. It is predicted that China's demand for oil will total 490 to 520 million tons annually by 2015 and 560 to 600 million tons by 2020, with an annual growth rate of 4.2% to 5%. Its demand for natural gas is

8 "Thought and Suggestion on Development of Domestic Offshore Oil and Gas Equipment and Making the Equipment Industry Bigger and Stronger" by Li Shuqing, *Petroleum and Equipment*, p. 73, April 2010.

9 "China's Dependency on Imported Crude Oil Exceeds 50 Percent" by Chen Yuqiang, *China Petroleum Daily*, 5 February 2010.

10 "China's Dependency on Imported Natural Gas Exceeds 50 Percent in Five Years" by Wang Gaofeng, *China Energy News*, 17 May 2010.

expected to total 234 billion cubic meters by 2015, with an annual growth rate of over 12%. The demand for natural gas will increase moderately from 2016 to 2020, but maintain an annual increase of 8%, exceeding 350 billion cubic meters by 2020.[11]

In the long run, China's demand for energy resources will expand in all aspects, but the development of its production capacity will lag behind. In the coming decade, production of oil will fluctuate at around 200 million tons annually, resulting in a widening gap between supply and demand. The rate of dependence on imported oil will top an estimated 60% by 2020 and 79% by 2035. The situation of natural gas will be similar to that of oil. It is predicted that China will import 30 billion cubic meters of natural gas in 2010, and 120 billion cubic meters in 2015; the rate of dependence on imported natural gas will soon exceed 50%.[12] Thus, the gap between supply and demand will be widening for a long time, and this will become an important factor in China's economic growth. To narrow the gap between supply and demand of energy has become an important issue for China, in order to safeguard its energy security.

Favorable factors and overcoming unfavorable factors in resolving energy imbalance through international cooperation

To resolve the imbalance in energy supply and demand and to secure an adequate supply of energy, China must take comprehensive measures both domestically and internationally. First, China needs to make great efforts in prospecting oil and natural gas domestically and in reducing reliance on imported energy resources as much as possible. Secondly, China must vigorously develop new energy and renewable-energy resources, optimize energy infrastructure, and strive to realize the goal of raising the proportion of non-fossil-fuel energy to 15% of total energy consumption by 2020. Thirdly, China should actively respond to climate change, and the need for energy conservation and emission reduction, and seek to

11 "Worries about China's Dependency on Imported Natural Gas" by Wang Gaofeng, *Energy* magazine, p. 67, No. 18, 5 May 2010.
12 "Prospect Forecast: Grasping New Changes in Future Energy and Oil Demand Pattern" by Huang Jiayin, *International Petroleum Economics*, p. 12-14, No. 12, 2009.

attain the goal of cutting carbon-dioxide emissions per unit of GDP by 40-45% by 2020, to build an industrial and transportation system with low carbon emissions. Fourthly, China should strengthen its Strategic Petroleum Reserves (SPR) and prevent the risk of energy supply disruptions. Construction for the first phase of the SPR project has been completed, with reserves equivalent to 30 days of imports. The second phase of the project is under construction. It is planned that by 2018 the total reserve volume will reach 660 million tons, equivalent to 90-100 days' consumption. Internationally, China needs to ensure multi-directional international energy cooperation in different areas, filling the gap between supply and demand and securing an adequate energy supply through international cooperation by importing fossil-fuel resources. As the gap between energy supply and demand tends to widen year by year, China's reliance on imported energy resources will rise simultaneously. In such circumstances, developing international energy cooperation and importing energy resources from other countries will play an increasingly prominent role in guaranteeing Chinese energy security. For China, there are many favorable conditions and also many unfavorable factors in importing energy resources from abroad.

Favorable conditions

First, world fossil-fuel energy resources can meet the world's consumption demand for many years. The global oil reserves/production ratio (proven recoverable reserves/exploited quantity annually) was 41.6 years in 2007; that for natural gas was 60.3 years, and that for coal was 133 years. This indicates that the global fossil-fuel energy resources can be exploited for many years. The continuously decreasing fossil-fuel resources will be partly substituted by non-conventional fossil-fuel resources. In such circumstances, China's petroleum and natural-gas enterprises will have enough time to seek international cooperation and to obtain energy resources from overseas.

Secondly, coordination and cooperation have become the mainstream in international relations with regard to energy resources. With the development of economic globalization

and the deepening of economic interdependence, countries in the world have stronger common interests. Countries worldwide have increasingly sought to replace energy competition with energy cooperation. There is extensive engagement in dialogue, in the exchange of views and in cooperative activities in various fields and at different levels, between energy producers and consumers, and between energy producers and international petroleum corporations. This has helped to build a good environment for China to participate in international cooperation.

Thirdly, China maintains good relations with both energy-producing and energy-importing countries. Most energy-producing countries in the Middle East, Africa, Asia and Latin America are developing countries that have traditionally had good relations with China. Nowadays, these relationships are being further consolidated and developed on a new basis. China has resolved historical border disputes with Russia and some Central Asia countries, and strengthened mutual trust and cooperation with them. It has also successively established comprehensive cooperative or even strategic partnerships with energy-importing countries, including developed countries like the United States, Japan, European Union states, and newly industrialized countries like India. In these countries, the "China Strategy Theory" is being gradually replaced by the "Stakeholder Theory" (whereby China is regarded as their stakeholder and equal partner) and the "China Responsibility Theory" (which means that foreign countries expect that China will take on international responsibilities jointly to resolve international issues). China and these various countries have attained considerable consensus and confirmed common interests on major international issues such as counter-terrorism, nuclear non-proliferation and tackling the international financial crisis. They are now closely coordinated in dealing with these issues. China's cooperation with these countries in the energy field is both expanding and deepening; many obstacles have been gradually removed. The recent equity acquisition of an oilfield belonging to the Norwegian National Petroleum Corporation in the Mexican Gulf by the China National Offshore Oil Corporation (CNOOC) and the fact that the United States

encourages Middle East countries to export more oil to China are convincing evidence of these trends.

Fourthly, China has a number of economic advantages. After 30 years' rapid development, its economic strength has substantially increased. Currently, China is the third largest economy, the largest trading country and the country with the largest foreign-exchange reserves in the world. In May 2010, China's foreign-exchange reserves increased to US$ 2.45 trillion. China thus has relatively ample funds to purchase overseas energy assets and engage in energy futures trading.

Fifthly, compared with the past, China has at its disposal a greater number of talented personnel and advanced technologies. After some 60 years of development, and more particularly by conducting international business since the early 1990s, many of China's oil enterprises have become internationalized enterprises with the ability to participate in international energy cooperation. Chinese oil enterprises are regarded as having the following advantages:

First, they are comprehensive oil enterprises that integrate the upstream and downstream sectors, domestic and international trades, production and marketing. Such a system can help to reduce the intermediate links in the operating process and organization, thus lowering operational costs and enhancing efficiency.

Second, they have experience in complicated geographical and geological conditions.

Third, Chinese oil workers have a tradition of hard work.

Fourth, through international cooperation, the Chinese oil industry has gradually cultivated and trained a strong team with relatively rich experience in international business.[13]

Unfavorable factors

Obtaining overseas oil and gas resources is becoming more and more difficult

First, areas that Chinese oil enterprises want to enter are not only very limited, but also highly risky; some oil fields are

13 "Overview of Going Global" by Tian Xing, *Chinese Petroleum Enterprise*, p. 43, No. 4, 2010.

in abandoned areas where Western oil companies have exploited for many years.[14] It will be very difficult for Chinese enterprises to open oil and gas fields that have better exploitation and operational value.

Secondly, oil-producing countries have either tightened the control of their domestic oil and gas resources, nationalized their private oil and gas fields, limited foreign control of their oil and gas fields by laws and regulations, or even raised taxes to new thresholds. These measures have further narrowed the space for Chinese enterprise to obtain overseas oil and gas resources and increased the investment risks.[15]

Competition with other oil-importing countries in acquiring equity oil overseas is getting fiercer

First, such competition comes from Japan, the Republic of Korea and India. As these countries and China face similar energy security situations, and have similar sources of importation for oil and gas, and similar strategic measures in tackling energy shortage, it is unavoidable that they will compete with each other.[16] It is more difficult and costly for Chinese oil enterprises to enter the upstream sector of the energy industry of the oil-producing countries. Secondly, pressure also comes from the United States. With the continuous increase in China's oil importation, the US will have more misgivings and suspicions about China in the energy field. China will inevitably face political and diplomatic pressures from the US in its efforts to obtain overseas oil and gas resources, and US oil and gas resources in particular.

China will face higher risks in obtaining equity oil and importing trade oil from abroad

First, the source of oil supply presents a high-risk coefficient. A total of 70% of China's imported oil comes from the

14 "Major Powers' Geographical Competition in Oil and Gas and China's Countermeasures" by Han Caizhen: www.hebccpi.com/printphp?Id=3140 – 23 April 2007.
15 "China's Perspective on International Energy Development Strategy" by Xia Yishan and Fu Quanzhang, Beijing, World Affairs Press, November 2009.
16 "India's New Strategy on Overseas Energy Resources" by Zhang Lijun, Collection of Special Reports on China's Energy Security and its Diplomacy on Neighboring Countries', China Institute of International Studies, 8 December 2005.

Middle East and Africa where the ethnic and clan relations are very complicated, and where turbulent political entanglements and frequent wars are pervasive, whether between countries or within a country. In the aftermath of World War II, 13 incidents of oil-supply disruption of different degrees occurred in the Middle East. China's investments in these regions may encounter the same political risks and instability of oil supply.[17] Secondly, the safety coefficient of imported energy-resource transportation is comparatively low; 90% of the overseas oil supply to China is transported by sea. Most of its supplies via marine transportation through oceans and straits is subject to harassment from international terrorists and pirates, as well as constraints in the various straits' transport capacities; temporary decreases and suspensions of maritime supply are easily caused. For instance, frequent ship hijackings by Somali pirates in recent years have severely disturbed maritime oil transport. Thirdly, China's "price hedging" ability is quite weak. China imports a great amount of oil, but so far it has not yet built its SPR to a corresponding scale, nor has it established a domestic crude-oil futures market. Therefore, it lacks the power to get involved in crude-oil price bargaining. It is believed that China has less than 0.1% of "bargaining power"[18] in setting world oil prices. China's current oil importation is largely conducted by on-hand merchandise trading. International hot money can jack up oil prices through the oil futures market before China even starts its oil purchasing, easily snaring China into a "price trap" of "buying high and selling low".[19]

Chinese oil enterprises have been involved in international energy cooperation for only a short time

For this reason, lack of experience, poor cooperation consciousness and a shortage of professional personnel also hinder China from expanding its international energy cooperation.

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17 "How to Deal with the Changes in China's Oil Market" by Qi Fang, speech at China Petroleum Summit, 19 March 2007.
18 "Report on National Energy Security" by Ni Jianmin, People's Publishing House, p. 402, 2005.
19 Ibid, p. 154.

Objectives and contents of China's foreign energy policy; stance and principles on handling special issues

Objectives

Along with its industrialization and urbanization, China's demand for energy is rising continuously, and the gap between supply and demand is further expanding. As a result, China has to import more oil from other countries. The oil imported from abroad includes traded oil and equity oil. The objective of China's foreign energy policy is to establish a reliable overseas energy supply system together with a domestic system that ensures the security of overall energy supply. This system will satisfy the requirements of "stable, economical, clean and safe".[20] "Stable energy supply" means China can obtain a long-term, steady and sufficient energy supply from abroad for its economic development. Hence, China should vigorously engage in international cooperation to increase the proportion of equity oil from overseas energy markets. "Economical energy supply" means oil prices should be reasonable. In this case, China should actively get involved in maintaining the stability of the international oil market by strengthening its "market voice" for achieving a reasonable oil price; and strive to solve the "Asian Premium" problem through cooperation with other energy-importing countries and international energy organizations. "Clean energy supply" means China should optimize its energy consumption structure by reducing the proportion of fossil-fuel energy in total energy consumption through international cooperation. China should start energy conservation, emissions reduction, pollution reduction, ecological environment protection, and the tackling of climate change simultaneously. The urgent tasks that face China now are: expanding its imports of clean energy, introducing advanced technologies for energy saving, reducing emissions, and developing clean energy. "Safe energy supply" means China should combat terrorist and pirate activities in order to safeguard maritime transportation through international cooperation. China should also strengthen its cooperation with surrounding energy-

20 Speech by Premier Wen Jiabao at the First Meeting of the National Energy Commission on 22 April 2010, *China Petroleum Daily,* 1st edition, 28 April 2010.

producing and transit countries, construct a diversified transport network by building more land-based energy pipelines to increase transport capacity, and reduce risks in cross-border energy transportation.

Contents

Overall, China's foreign energy policy has two main contents: international cooperation and diversified operations. Both these fulcra are regarded as indispensable.

International energy cooperation

The new concept of energy security is the ideological basis for international energy cooperation

Under the influence of economic globalization, energy security is becoming a global issue. Resolving the current energy-security issue should follow a new way of thinking that is adapted to the times. At the dialogue conference between G-8 leaders and developing countries in July 2006, Chinese President Hu Jintao proposed a new energy-security concept of "mutually beneficial cooperation, diversified development and coordination to ensure energy security". This concept entails a new way of thinking based on an evaluation of the global security situation in the new age. It also focuses on future development. First, the new concept takes common energy security as the base. That is to say, China's domestic energy security should be incorporated in global energy security. All countries in the world should respect each other and take into account each other's interests so as to achieve a balance of overall interests. Secondly, the core of the new energy security concept is cooperation. The world is becoming more interdependent. Energy security can only be achieved through cooperation rather than hostile competition or the threat of force. Differences and contradictions should be resolved through dialogue and negotiation. Only through international cooperation can domestic energy security be effectively ensured. Thirdly, the objective of cooperation is to promote energy security and achieve mutual benefits and a win-win situation.

International cooperation can only be realized and sustained by adhering to the mutual-benefit principle.[21]

Lines of cooperation

Cooperation with international organizations

International energy organizations play an important role in stabilizing the international energy market and ensuring international energy security. Cooperation with international energy organizations can provide a platform of multilateral energy diplomacy and raise China's influence in the world energy market. At present, the most influential international energy organizations in the world are the International Energy Agency (IEA) and the Organization of Petroleum Exporting Countries (OPEC). China has not yet cooperated adequately with these organizations. To join in international energy organizations and establish a close cooperative relationship with them are top priorities for China, in order to expand its international energy cooperation.[22]

Cooperation with energy-producing countries

Currently, the oil China imports from producing countries is mainly traded oil, while equity oil still accounts for a small proportion. To minimize the adverse effects of volatile fluctuation of oil prices and to obtain a steady oil supply, China needs to increase investment in overseas oil exploration and obtain more oil-field equities by means of buying shares and engaging in mergers and acquisitions. Currently, most oil-fields with rich deposits in politically stable regions are owned by multinational corporations. Many oil-producing countries have nationalized energy resources over time in response to periodically soaring oil prices. Consequently, China has to seek new sources of oil and gas in areas plagued with social unrest and rampant terrorist activities, such as West Africa, North Africa, the Persian Gulf, the Caspian Sea and south-east Asia.[23]

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21 "China's Perspective on International Energy Development Strategy" by Xia Yishan and Fu Quanzhang, p. 212, 1st edition, Beijing, World Affairs Press, November 2009.

22 "The Pattern of International Energy Cooperation and China's Strategic Choice" by Ye, doctoral dissertation, p. 20, China Foreign Affairs University, 2005.

23 "China and Russia Cooperate in Establishing Energy Security", interview with Xia Yishan, senior research fellow at the China Institute of International Studies, *Chinese Petroleum Enterprise*, p. 36-37, No. 7, 2006.

Cooperation with oil-importing countries

The successful experience of international organizations such as IEA, which includes major oil-importing countries, shows that cooperation can bring many benefits to oil-consuming countries. Through coordinating policies, exchanging information, stabilizing the market, and achieving mutual political trust, these countries can work together to withstand oil crises and prevent oil-supply disruptions by exerting their influence to curb unreasonable oil prices. China attaches importance to multilateral cooperation with oil-importing countries/regions, particularly the United States, Japan, the EU and India, and is cooperating with these countries/regions in many areas. Chinese oil companies frequently buy shares of overseas oil and gas fields jointly with foreign oil companies. The Chinese government has met the energy ministers of the United States, Japan, the Republic of Korea and India many times to discuss measures, and will further expand and deepen energy cooperation with these oil-importing countries.

Cooperation with transnational corporations

Because of their advanced technologies and rich management expertise, many transnational corporations hold a large portion of global oil reserves. Chinese enterprises need to reach out to cooperate with these transnational corporations by means of joint investments, cooperative operations, acquisitions and mergers. China should also invite transnational corporations to explore and exploit in some Chinese basin areas, and open its end-use markets to international oil companies to supply oil for the Chinese domestic market. Shell Oil and some other international oil companies have been entering China's refined-oil-products market. China can also learn about advanced technology, management skills and the international energy markets through cooperation with the transnational corporations.

Areas of cooperation

Cooperation in establishing the oil pricing mechanism

Oil prices play a very important role in national energy security. China's oil imports account for 6% of the world's total

oil trade, but its power of influence in setting the international oil price is less than 0.1%.[24] This is directly related to the fact that China does not participate in world oil-futures markets and has few risk-aversion mechanisms. Japan and the Republic of Korea (RoK) have similar problems. In addition, there is the problem of the "Asian Premium"; that is, Middle East oil-producing countries may charge higher oil prices to Asian countries than are charged in the European or North American markets, which control crude exchanges and set the rules. To resolve these problems, China needs to establish its own domestic oil-futures market to reduce or eliminate the Asian pricing mechanism jointly with Asian oil-importing countries including Japan, the RoK and India.

Cooperation in Strategic Petroleum Reserves (SPR)

The SPR is an important means to safeguard China's national energy security. China's SPR has just been established and is quite small in scale. To develop cooperation with other energy-consuming countries and to establish modes and mechanisms of cooperation is very important to ensure Chinese integration into the international energy markets. To participate in the global energy reserves mechanism, China may cooperate with the IEA at the very beginning. Currently, China cooperates with the IEA in such fields as construction of underground oil-storage facilities, ways of releasing oil reserves in a state of emergency, information-sharing, etc. By learning from the experiences of the member states of the IEA, China will formulate its own SPR policies as early as possible.

In Asia, IEA member states Japan and the RoK have built a sound SPR system, whereas many other countries and regions have only a compulsory reserve system for oil companies.[25] In the event of an emergency, most Asian countries have only limited oil reserves available. Therefore, to ensure security of oil supply for the Asian area, China and other Asian countries may need to co-invest in the construction of joint storage facilities and establish a regional oil-reserves cooperation mecha-

24 "Contend for the Oil Pricing Power in Asia", *Xinhua Daily Telegraph*, 4 September 2006.
25 "Actively Conduct International Multilateral Energy Cooperation to Address Global Oil Crisis" by Qin Haijing, *Xinhua Daily Telegraph*, 11 August 2005.

nism by exploiting each other's advantages and learning from the Japanese and Korean experiences.

Cooperation in the construction of an energy transport corridor

Due to the huge demand for oil and gas and its geographical position, China is not only a recipient country for oil and gas transported by overseas pipeline, but is also an important transit country, connecting oil- and gas-producing countries/regions such as Russia and Central Asia with other energy-consuming countries in its Asia-Pacific region, including Japan, the RoK, India and the other ASEAN countries. In cooperation with the oil-producing countries, China has already completed the construction of the China-Kazakhstan oil pipeline, and the Central Asia-China natural-gas pipeline, and is constructing the China-Russia oil pipeline and the China-Myanmar oil and gas pipeline. The China-Russia natural gas and other oil and gas pipelines are currently being planned. Construction of oil and gas pipelines to China, and energy networks leading to Japan, the RoK, India, and the ASEAN and south-eastern countries via China is an important component of China's international energy cooperation.

Cooperation in exploration of oil and gas, and use of new energy technologies and renewable-energy resources

Developed countries have advantages in energy exploration and exploitation, and research and development (R&D) of new and renewable-energy resources. China has huge demand for these. Introducing technology, experience, talents and funds from developed countries can help China to better explore and exploit its energy resources, improve the efficiency of energy use, increase the value-added of products, and exploit the potential of new and renewable-energy resources. In these areas, China is actively cooperating with the United States, the EU and Japan.

Cooperation in information-sharing

China has already engaged in information exchanges at multilateral levels related to energy resources. To achieve high-quality internet delivery of information, China needs to further enhance mutual trust and join some of the world's multilateral

cooperation mechanisms so as to establish an extensive information-sharing network.

Diversified operations

The framework of China's foreign energy policy was conceived after China became a net oil importer in 1993. In fall 2001, China put forward a diversified energy strategy for the first time. Since then, the strategy has been further enriched, and has become an important part of China's foreign energy policy, which includes the following main elements:

Diversified import sources

China should import oil and gas not only from the Middle East, but also from Africa, Russia, Central Asia and Latin America, and particularly from adjacent regions with political stability and fewer risks.

China established as a priority the establishment of diverse sources of imports and put forward ideas such as "consolidating energy resources imports from the Middle East; developing neighboring regions; expanding to Africa and exploring in Latin America". However, these plans may not be as feasible as hoped. For instance, China regards Russia as its key cooperative partner in the field of energy; but negotiations on the Sino-Russian pipeline project went on for 15 years without any result. Only when Russia needed China's loans during the financial crisis could the negotiations be concluded. In another example, CNOOC was forced to drop its bid for Unocal Corporation because of obstruction by the US government out of fear of the security risk that the acquisition might have led to. The US has opened its energy markets to Chinese enterprises only in a limited way. Therefore, Chinese enterprises are often forced to bid for other oil and gas fields without due concern about location, risk and condition. This is why many Chinese enterprises have little choice but to cooperate with some "problem-plagued" and "authoritarian" countries.

Varieties of imported energy resources

China imports not only oil, but also natural gas, liquefied natural gas, oil sands, etc. As importing natural gas will help

to reduce environmental pollution and improve its energy-consumption structure, China's government gives priority to supporting imports of this clean energy.

Diversified ways of importing oil

China imports equity oil and purchases traded oil at the same time. It will be focusing on trading futures, purchasing traded oil, and engaging in "stock in trade" simultaneously. In future, it will also give priority to increasing its role in futures trading and equity oil by exploiting the potential of overseas oil markets.

Diversified means of transportation

While developing oil and gas maritime transportation, China also seeks to develop overland transportation, and lay more oil and gas pipelines to raise the safety of oil and gas transports.

Diversified cooperation in the field of energy

China is now cooperating with energy-exporting countries, transit countries, importing countries, and international organizations. It has cooperated not only in the fields of oil exploration, refinery and transportation, but also in technology in the areas of energy conservation, improved efficiency, new and renewable-energy resources, developing nuclear energy and clean use of coal.

China's stance and principles in handling some special issues

China has encountered particular problems in expanding its international cooperation, such as the stability and security of oil-producing countries, and the lack of social responsibility in key oil-producing countries. Ways of handling these problems need to be constantly improved.

The stability and security of oil-producing countries

In question here are issues such as the Sudanese Darfur issue, the Iranian nuclear issue and the Somali pirate issue.

The Darfur issue

The Darfur issue has lasted quite a few years, but the crisis came to a head in 2003. Since then, the conflicts have gradually expanded, causing a serious humanitarian crisis. Thanks to the intervention of and mediation by the international community, including the Chinese government, progress has been made in negotiations between the Sudanese government and the Darfur anti-government organizations. A ceasefire agreement was signed on 23 February 2010, putting an end to the seven-year armed conflict.[26] China's position on this issue is as follows:

First, China advocates that the international community make joint efforts and encourage the opposing sides to resolve conflict through dialogue and negotiation. China believes that characterizing the nature of the Darfur issue as "genocide" and seeking the arrest of Sudanese President Omer Al Bashir will make the problem more complicated and difficult to resolve.

Secondly, China is prepared to jointly "intervene" in the Darfur issue with the international community and act as a mediator. China remains in touch and communication with the Sudanese government and the different factions of the anti-government forces, making constant efforts to promote negotiations and peace among them by dispatching special representatives to mediate, together with international and regional organizations, the Egyptians, the Qataris and the US special representatives, in order to press for an early settlement of the conflict.

Thirdly, China supports sending UN peacekeeping troops to Darfur. China's principles are: (i) No infringement of the sovereignty of the country concerned; (ii) There must be United Nations authorization; and (iii) Such action must be at the invitation of the country concerned. China has sent 315 soldiers to join the peacekeeping force, contributed humanitarian aid to Darfur, and provided funds to the African Union Mission in Sudan.

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26 "Darfur Issue: New Test on China's Africa Policy" by He Wenping, *World Outlook*, Shanghai Institute of International Studies, p. 78-92, No. 2, 2010.

The Iranian nuclear issue

Iran is a major oil-producing country, and also one of China's major oil suppliers. The Iranian nuclear issue is complicated and difficult to handle. The resolution of the issue has implications for world oil and gas supplies and also for China's national energy security. China thus attaches great importance to the resolution of the issue. China's stance is as follows:

Firstly, China advocates peaceful settlement of the Iranian nuclear issue through dialogue and negotiation. China believes that to settle the issue by use of force would have serious consequences; it thus hopes that the parties concerned will intensify their diplomatic efforts and promote dialogue to reach a comprehensive, long-term and proper settlement.

Secondly, China firmly supports the international nuclear non-proliferation system, opposes nuclear proliferation, and insists that all countries have the right to the peaceful use of nuclear energy.

Thirdly, in terms of the UN sanctions against Iran, China does not support extending sanctions to Iran as it seeks to avoid damaging the lives of ordinary Iranian people and Iran's normal economic, financial, and trade contacts with other countries. It believes that the imposition of sanctions should not mean abandoning or weakening the efforts to resolve the Iranian nuclear issue peacefully through dialogue. In brief, sanctions should not impair the interests of the Iranian people and other countries; instead, they should strengthen the international nuclear non-proliferation system.[27]

The Somali piracy issue

In recent years, rampant Somali piracy has threatened navigation safety in the Gulf of Aden and around the Horn of Africa. The international community, including China, has dispatched warships to protect commercial ships from the piracy in the seas off the Somali coast. However, internal contradictions in Somalia and the weakness of its government have led to opportunities for Islamic terrorist organizations in

27 "International Political Outlook in 2010 (Part II): Entanglement of Hot-Spot Issues Causes Reconfiguration of Interests and Contradictions", *People's Daily*, p. 23, 21 January 2010.

southern Somalia and the pirates to collaborate. Should Somalia and Yemen become controlled by terrorist organizations, the Gulf of Aden would be a transit sea besieged by terrorists, and the Horn of Africa would be a "paradise" for terrorist activities. This would pose a threat to the safety of international energy transports. China's stand is as follows:

First, to ensure the safety of commercial shipping, China (together with other countries) has dispatched warships to patrol and escort commercial ships in the areas where piracy activities are frequent.

Secondly, China believes that the fundamental means of resolving Somali piracy is to solve the problems of internal disorder, the weakness of the Somali government, and the country's economic deterioration and desperate poverty. These domestic problems are regarded as the root cause of Somali piracy. Without the resolution of these problems, Somali piracy will never be eliminated.

Chinese enterprises' transnational responsibility

With sustained economic growth and a continuous rise in energy demand, more and more Chinese energy enterprises are going abroad to seek international cooperation. The Chinese government has always attached importance to social responsibility and encouraged Chinese enterprises to protect the ecological environment in foreign countries, and to return value to the local society so as to ensure a "mutually beneficial and win-win" situation. For instance, Chinese enterprises are required to stick to the principle of "seeking harmony between energy development and the ecological environment" by applying new environmental protection technologies, and sticking to the "Three Nos Principle": that is, "No Initiation, No Construction and No Service" in the case of projects that do not meet environmental protection requirements.[28] Chinese enterprises are also required to effectively fulfill their social responsibility and to return value to local communities.

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28 "Perspective Focus" by Tian Xing, *Chinese Petroleum Enterprise*, p. 51, No. 4, 2010.

Progress in China's international energy cooperation since the financial crisis

The international financial crisis that broke out in the second half of 2008 has strongly affected the global economy. Now the crisis is fading away and the world economy is slowly recovering. The financial crisis has brought China both opportunities and challenges. In terms of challenges, China's economy has encountered unprecedented difficulties in a slowing-down of its economic growth. In terms of opportunities, Chinese enterprises, particularly energy enterprises, have been able to expand their international cooperation more actively. Thanks to the decline of demand and increasing supplies of oil and natural gas, international oil prices fell temporarily, but have since recovered. It has been a good opportunity for China to take the initiative to expand its international energy cooperation.

First, China has boosted the scope of its cooperation with the United States, Japan, the EU and international organizations. Through multilateral cooperation in the field of energy and by strengthening policy dialogues on such issues as energy security, climate change, technologies and funds, China has enhanced mutual political trust with many developed countries and international energy organizations, consolidated cooperative achievements, and created a good environment for Chinese enterprises to expand their international energy markets.

Secondly, China has increased its SPR. Before the emergence of the financial crisis, China had already completed the first phase of the SPR project and begun the construction of the second phase. By taking advantage of low oil prices on the international market, China has purchased and stored crude oil in large quantities in order to avoid suffering from the fluctuation of international oil prices in the future.

Thirdly, China has signed a number of loans-for-oil contracts. After the international financial crisis, many resources host countries were obliged to sell crude oil at comparatively lower prices to meet their financial needs. During this period, China signed a number of loans-for-oil contracts with them. In May 2009, China successively signed

three long-term oil-supply contracts with Russia, Brazil and Venezuela, for a total of US$43 billion. After that, China completed long-term loans-for-oil agreements with Ecuador and many other resources host countries. These agreements helped to both mitigate their shortages of funds and meet China's demand for crude oil.

Fourthly, China has signed a number of merger and acquisition contracts for overseas oil and gas fields. After the global financial crisis, Chinese enterprises have made substantial progress in acquiring overseas oil fields. These acquisitions have the following characteristics:

(i) Many acquisitions are large-scale. The most prominent deals are the China National Petroleum Corporation (CNPC) acquisitions of the Rumaila and Halfaya oilfields in Iraq, and the North Azadegan oilfield and the South Pars gas field in Iran in 2009. The China Petroleum & Chemical Corporation (SINOPEC) made a takeover bid for the Swiss Addax Petroleum Corporation for US$9 billion, the largest cross-border purchase of oil and gas assets to date for a Chinese enterprise.

(ii) The acquisitions cover a wide range of regions, resources and activities. There have been acquisitions in Africa, the Middle East, South America, North America, Russia, Central Asia and the Asian-Pacific region. The types of energy resources acquired include oil, natural gas, liquefied natural gas, oil sands, uranium and coal. The activities of the energy companies acquired include upstream exploration and development, middle and downstream refining, transportation, and sales.

(iii) The methods of acquisition include sole acquisition and joint bids. For example, CNPC and an American oil company collaborated in buying the development license of the Iraqi super-sized Rumaila oilfield. CNPC and Shell Oil completed a deal to jointly explore the Block D gas basin in Qatar. Allied with the Türkiye Petrolleri Anonim Ortakligi (TPAO), the national oil and gas company of Turkey, CNOOC signed a technical services contract with the Iraq Drilling Company for joint exploration of the Missan Oil-fields in Iraq. The signing of these contracts helps to both mitigate China's domestic energy needs and contribute to world energy security.

(iv) Further progress has been made in the construction of international oil and gas pipelines leading to China. In October 2008, China and Russia signed a loans-for-oil agreement, and also reached agreement on building the China-Russia oil pipeline. The construction of the pipeline was completed in late 2010 and it has begun to supply oil for China. In December 2009, the Central Asian natural gas pipeline from Turkmenistan to XinJian in China was completed and began to supply gas to China. The planned maximum supply capacities are: Turkmenistan gas at 40 billion cubic meters per year; Uzbekistan gas at 10 billion cubic meters and Kazakhstan gas at 10 billion cubic meters. In May 2009, an inter-governmental agreement on the China-Myanmar pipeline was signed. This pipeline is now under construction, with a planned oil transport capacity of 22 million tons annually.

Conclusion

It has been demonstrated that China's foreign energy policy is effective and conducive to better Chinese and international energy security. China will continue to implement this policy and adhere to the principle of "mutual benefit and win-win cooperation to achieve common development". It will also expand and deepen exchanges of views, dialogue and cooperation with a range of countries, transnational corporations and international energy organizations.

Currently, the world economy appears to be stabilizing and recovering, and demand on the international energy market is slowly picking up. To make the best use of this favorable opportunity, China will encourage its domestic energy enterprises to be actively involved in investment in and development of overseas energy resources, to accelerate the construction of international oil and gas pipelines to China, to enhance its competitiveness and to strengthen its voice in international exchange markets, so as to provide the energy necessary for the country's steady and rapid economic growth and the recovery of the world economy.

Chapter Three

China's position and policy on climate change

Chen Dezhao*

Since the Industrial Revolution, human activities based on the incineration of fossil materials and deforestation have resulted in a rapid increase in greenhouse-gas emissions, leading to apparent global warming and making the 20th century the warmest of the past 1,300 years.[1] Extreme weather, such as drought, flood and sand-storms, has emerged in China and many other countries, having a serious impact on life and production for humankind. The climate issue has become the most important issue in the environmental field and the focal point in political, economic as well as social affairs, attracting the widespread attention of the international community.

How does China view climate change?

Human beings are facing an unprecedentedly severe situation as a consequence of climate change

The UN's Intergovernmental Panel on Climate Change (IPCC) report (2007) claimed that worldwide greenhouse-gas emissions had increased by 70% in the past 70 years. By 2030,

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1 During the 20th century, the mean annual temperature of the Earth's surface rose by 0.74° Centigrade; the 11 years from 1995 to 2006 are the warmest since weather records began.

the total emissions load of six greenhouse gases will be 25% to 90% more than in 2000. The "sensitivity" of climate has been rising.

The world community has come to recognize that greenhouse gas (GHG) emissions from human activities are the primary cause of global warming. The 2007 IPCC report argued that, without emissions reduction, the global average temperature may rise to 6.4°C by 2095.

Global warming has already caused serious damage. It threatens all human society. First, it changes world climate patterns by increasing rainfall in the mid and high latitudes while at the same time decreasing rainfall in African regions. The frequency and intensity of extreme climatic phenomena, such as El Nino, drought, floods, thunderstorms, hailstones, hurricanes, hot weather and sandstorms, keep increasing. Secondly, global warming destroys the biological chain and the food chain, which in turn may have more severe natural consequences. In addition, global warming directly leads to high temperatures in summer in some regions, taking many lives every year by inducing heart disease and respiratory problems. Global warming also gives rise to the wider spreading of infectious disease.

China is believed to be one of the countries most affected by natural disaster; economic losses caused by weather disaster have risen to between 200 and 300 billion RMB per year. China has a large expanse of desert, located mainly in the dry northwest region. The main cause of this desertification is believed to be "anthropogenic activities".[2] Over-farming and the overexploitation of water resources in the upper streams of China's inland river basin leads to the degeneration of vegetative cover in barren land and in the desert oases. According to statistics, the lost farmlands in China caused by water losses and soil erosion exceed 8.25 million acres in the past 50 years. Currently, the area of soil erosion is about 3.56 million square kilometers, equivalent to 37% of the total size of China. Desertification extends across 1.74 million square kilometers, and the tendency

2 Xiao Wei, "Ecological security relies on scientific development", Wenhui newspaper, 2006, 6, 5.

is becoming even more aggressive. The soil salt-alkalization areas and agricultural land eroded by salt-alkalization are rapidly expanding, explaining the frequent sandstorms in the northern regions of China. More than 58 million people live in drought-stricken areas in China, suffering from the threat of water scarcity over a long period of time.

Clearly, climate change not only affects the living environment and condition of human beings, but also whether or not human beings can stay alive healthily. Every country should take full responsibility for itself as well as the whole human race in dealing with the climate issue earnestly and positively.

Climate change is an issue of development first, and can only be mitigated and managed in the course of development

In the history of human civilization, the material wealth created by industrial society in the last several hundred years has far exceeded the total created in primitive and agricultural societies over the previous several thousand years. In the same recent period, people's living standards have improved much faster than ever. Meanwhile, the harmful effects of climate change caused by human activities in the past two hundred years have also far exceeded those of past periods. History shows that, in the process of industrialization and modernization, it is difficult for a lower-income country to skip the stage of high growth in both energy consumption and emissions on the way to becoming a higher-income country.

For the following reasons, the climate issue in China is becoming an increasingly strong impediment to industrialization and modernization.

1) China has long been a poor and backward country, with a weak industrial foundation and a low starting point in its development. This has forced China to adopt a broad-based development strategy. It is extremely difficult for China to change its low-end position in the international labor market in a short period of time.

2) China is working towards "compressive industrialization". Some European countries pursued their industrialization

process over 200 years, from the beginning of the industrial revolution in the latter half of the 18th century to the latter half of the 20th century. It has taken only 50 years for China to achieve its initial industrialization. Today is the best time in China's history; people's living standards and economic growth have greatly improved. In a huge developing country like China, with a population of 1.3 billion people, providing the basic daily necessities of life such as food, clothing, housing and communication for ordinary people is a great contribution to a world of peace and prosperity as well as world civilization. However, "under certain circumstances, development is combustion, and the resources are burned and the leftovers are pollutions".[3] The faster the development, the more resources are consumed and the more air pollution is created.

3) China is the most populous country in the world. This very large population with areas of extremely high population density will be the basic reality of China for some time to come.

Especially with the acceleration of urbanization and the expansion of the middle class, demands on housing, transportation, household appliances and private cars are increasing rapidly. This greatly increases the discharges of greenhouse gases such as carbon dioxide. The limited attention that has been paid to environmental protection, energy-saving and emissions reduction until now has worsened the climate-change problem in China. Based on UN criteria, China still has 150 million people in poverty, of which about 15 million are in a state of absolute poverty. Different from the situation in developed countries, human rights in developing China relate much more to people's right to survival. China faces multiple pressures in economic development, poverty reduction, environmental deterioration and air pollution all at the same time. Most developed countries have never faced such challenges.

Climate change, on the one hand, is the byproduct of industrialization; on the other, social and economic progress are essential to providing financial and technology solutions to climate change, and laying the material foundation for public

3 China International Cooperation Commission for Environment and Development, *2006 Year Report*, p. 158.

awareness of the climate-change issue. Generally speaking, the solutions to climate change should promote rather than impede the further progress of human society. Sustainable solutions can only be found through the scientific development of social and economic progress.

The climate issue is both a social problem of today and a historical problem

Historically speaking, GHG emissions experienced a substantial transformation in developed countries both before and after the industrial revolution. Before the industrial revolution, the respective densities of the main six greenhouse gases were: CO_2 280ppm, CH_4 700ppb, N_2O 270ppb, CFC_{11} and HFC_{23} zero, CF_4 40ppt. By 2005, those concentrations had risen to 379ppm, 1174ppb, 319ppb, 251 and 18ppt, 74ppt, respectively.[4] Even now, developed countries account for most carbon-dioxide discharges in the world.

GHG emission intensity and energy consumption at different stages of development in each country are usually different; they may display an inverted-U formation first – increasing rapidly, then dropping over time. Currently, China is at the rising stage of the curve, while developed countries have already passed their peak emissions and have begun or are on the verge of the descending phase. According to the International Energy Agency (IEA), the carbon-dioxide emissions of China in 2007 were 6.03 billion tons, 260 million tons more than the United States. China was ranked world number one in discharge of methane, and the discharge of nitrous oxide was also ranked very high on the world scale. However, China's historical cumulative emissions are relatively low. In over 50 years from 1950 to 2002, China's carbon dioxide, discharged by fossil-fuels combustion, accounted for only 9.3% of the world total amount, while the emissions per capita were substantially lower comparatively. In the 15 years from 1990 to 2004, when world GDP gained 1%, the world average emission of carbon dioxide increased by 0.6%, whereas in China the increase was only 0.38%.

4 IPCC *Scientific Basis of Climate Change,* 2001, p. 38, and IPCC 2007, p. 141.

Climate issue is not only a domestic but also a global issue that requires international vision to resolve

Climate change has become an international issue for three main reasons:

First, climate change is a transnational issue. Climate change in one country or one region will affect other countries and regions.

Second, climate change is a product of the interrelationships among other issues, such as energy-use patterns (e.g. which fossil fuels we depend on), population size and growth (e.g. more people will produce more greenhouse gas), the wealth gap (e.g. rich and developed countries produce most greenhouse gas), technologies (which help us find alternative energy), and other future issues (whether climate change can severely hurt human life on earth).[5]

Third, climate-change challenges can only be resolved through international cooperation rather than by individual efforts by one country or region.

For China, however, the particular reason why climate change must be addressed as an international issue lies in the fact that for China, the export of manufactured products has a very important role in its economy. In 2008, China exported 59 million tons of steel and 12.13 million tons of coking coal, both of which are products that involve high energy consumption and high GHG emissions. The export of these products increases carbon-dioxide emissions for China while it reduces the carbon-dioxide discharges in the importing countries.

Five key elements in the response to climate change

To meet the climate-change challenge, at least five elements important to both developed and developing countries must be considered:

First, solutions must be found in a context of the harmonious development of nature and humankind and the improvement of economic structures.

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5 John L. Setz, *Global Issues: An Introduction* (third edition), Social Science Literature Press, 2010, 3, p. 2.

Second, scientific and technological innovation are essential.

Third, the response will rely heavily on both system and regulatory reform and reconstruction.

Fourth, the public must participate actively.

Fifth, any effective response will require the strengthening of international cooperation.

For China, all these elements have special meanings. The backwardness of the Chinese energy structure and technology, which are far behind its economic development, is the major reason for the country's high GHG emissions.

China is an energy-consuming country that relies heavily on coal, but most coal-mines contain considerable amounts of methane gas, making coal-mining particularly dangerous. Many hydrocarbons such as CH_4 released during the exploitation of coal are significant greenhouse gases. In developed countries, coal is mainly used for electricity generation, while, in China, much coal is burned directly for cooking and heating. A total of 80% of the sulfur in coals is transformed into sulfur dioxide and discharged directly into the air. Meanwhile, China's market mechanisms are still being perfected. The establishment of a "green" way of life and the transformation of lifestyles in a country with such a large population will require long-term efforts. For China, the most important means is to acquire experience of and funding for energy-saving and emission reduction through international cooperation. But such efforts seem always to be blocked by the "green obstacles" such as lower-emissions standards and high emission-reduction requirements set by the developed countries.

Tackling climate change is in the common interest of all nations – viable solutions must follow win-win and multi-win principles

Solving the climate problem is in the common interest of every nation in the world; but it is also the very issue where conflict and competition arise amongst the various interest groups. From a long-term point of view, every country hopes

to protect its environment and to avoid the negative consequences of climate change. However, in the short term, no country is willing to reduce its own GHG emissions voluntarily if it comes at the cost of narrowing its own room for development. Every country wishes to benefit from other countries' actions to reduce emissions.[6] Thus far, the core of the climate issue is how to strike a balance between the interests of individual nations and those of the world, between the present and the longer term, and between different countries, in order to achieve a win-win solution.

China's goals, policies and actions on climate change

China's goals on climate change

The ultimate goals for China on climate change are to achieve the harmonious development of human beings and nature, to promote the communal development of all nations in the world through international cooperation, and to ensure the well-being of all humankind.

Four characteristics in policies and actions for China to solve the climate-change issue

Emphasizing work on domestic affairs

Doing a good job domestically is very important to coping with climate change. For China, the key solution is to pursue scientific development to shape an energy-saving and environmentally friendly industrial structure, pattern of growth and consumption model.

Four key measures are required to transform the economic structure.

First, promote the proportion of tertiary industry in the economy. The service industry, especially the modern service industry, consumes less energy and raw material, occupies less land and discharges little greenhouse gas. Promoting the proportion of tertiary industry will reduce the energy intensity of the overall economy.

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6 Zhuang Guiyang, Zhu Xianli, Tang Xingshu, "Global environment and climate governance", Zhejiang People's Press, 2009, 5, p. 196.

Secondly, improve the structure of the manufacturing sector by promoting the proportion of high-tech added value in industry.

Thirdly, strive to develop renewable-energy resources to optimize the lower carbon intensity of Chinese energy consumption. Our goal is to boost the proportion of total volume of exploitation and use of renewable resources up to 10% of primary energy supply by 2010.

Finally, weed out low technology, which is highly polluting.

Integrating law enforcement, economic leverage and technical measures to mobilize the effective role of governments at all levels

On the basis of existing law and regulations, it is clear that China is among the countries that have established energy-saving, emissions reduction and climate-change issues as national strategies, reflected in national development planning relatively early. In 1978, right after the "Proletariat Cultural Revolution", China for the first time put environmental protection and pollution control in a constitutional amendment, which stipulates that "the State has obligations to protect [the] natural environment and natural resources, to prevent pollution and other environmental disruptions". Thus, China's efforts in environmental protection and pollution prevention are mandated by the Constitution.

In September 1979, the National People's Congress ratified the Environmental Protection Law of the People's Republic of China (Draft), the first environmental-protection law in China's history; it also filled the blanks in the laws on environmental protection and pollution prevention.

In 1983, environmental protection and pollution prevention were set as basic policies of state, whereby climate-change challenges were promoted from marginal issues to a central place in the path to modernization.

In June 2007, the Chinese government issued a national program aimed particularly at climate-change control – the first such program launched by a developing country. The program put forward a quantitative reduction indicator, of

cutting 20% of the energy consumption per unit of GDP by 2010 in comparison with the same level in 2005.[7]

In November 2009, on the eve of the Copenhagen conference, the Chinese government once again announced a "clear quantitative indicator", emphasizing the importance of the climate-change issue in national economic strategy and social development, and setting the objective of reducing carbon-dioxide emissions per unit of GDP by 40% to 50% by 2020 in comparison with the same level in 2005.

On 20 January 2010, the executive meeting of the State Council passed a resolution to strengthen the penalty for industry pollution and eliminate gradually heavily-polluting production capacity. It ordered the creation of a favorable market environment for the gradual elimination of inefficient productive capacity; improved implementation of laws and regulations; the establishment of criteria for threshold technologies, and the clarification of the responsibilities and duties of the various national and local governments and enterprises. The decision demonstrates the administrative character of the Chinese government in tackling at one time the legal, economic, technical and administrative measures necessary to deal effectively with climate change.

Accelerating institutional reform

Among the measures adopted by the Chinese government in coping with climate change, institutional reform holds a very important position. An example is the use of water resources and the resolution of water-resources conflict. Here China has implemented important institutional reform. First, China conducts integrated management of river basins; this is the general trend for neighboring countries in dealing with water issues, and an important method of resolving the increasingly severe resource problems in Chinese river basins. The integrated management of river basins is not the simple

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7 According to China's National Development and Reform Commission, in the first half of 2009, China's energy consumption per unit of GDP fell by 13%, representing a reduction of 1.5 billion tons in carbon-dioxide emissions in five years. The restricting index in the 11th Five-Year Plan (2006 to 2010), to reduce energy consumption per unit of GDP by 20%, is expected to be attained. See "China announced the clear target for reduction of greenhouse gas emission for the first time", Xinhuanet, 2009, 11, 26.

interaction of original water resources, water environment, water and soil conservation, wetland reserves and forest restoration, but also requires a management system that transcends the boundaries between regional governance and administrative management, based on the ecological system, and ensures the full participation of all related stakeholders.[8]

Secondly, the guidance on market orientation provided by the State is being reinforced. In the past, administrative intervention was the main approach to resolving water-resource disputes. However, that management approach does not respond to the need for social and economic development. On the basis of an analysis of the institutional barriers in the current water-resources management system, China has been seeking a new model for river-basin management based on the management of property rights, the market, price and environment. At present, China is establishing and perfecting an Environment Pollution Liability Insurance System to strengthen the management of environmental pollution by introducing market-oriented measures. In February 2008, the State Environmental Protection Administration and China's Insurance Regulatory Commission jointly issued Guideline Opinions on Environment Pollution Liability Insurance, formally setting up the Environment Pollution Liability Insurance System. China had anticipated this system by mandating the Environment Pollution Liability Insurance System, in the Eleventh Five-Year Plan period, to carry out a demonstration pilot project in related industries and regions, and to set up an inventory of insured enterprises or facilities based on environmental risk assessments.

China is planning to enact the environmental pollution liability insurance system by 2015, with nationwide compensation criteria for environmental damage, an expansion of the mechanisms of risk and loss assessment, determination of responsibility, handling of accidents, and capital compensation.

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8 Cheng Yishu, "Integrated river basin management is the inevitable trend for governance, reform and development for river", Scientific & Technology Review, Vol 26, 2008, No. 17.

The Green Insurance Mechanism is China's second environmental economic policy following the Green Credit and Loan program. The establishment of this mechanism symbolizes the transition of China's environmental protection work, including water-resources protection, from an administrative-control system to market-oriented management mechanisms. Before the implementation of these mechanisms, in the event of an environmental accident, it was hard to enforce the responsibilities of the related enterprises to compensate for and restore the polluted environment. Victims were unable to get compensation in reasonable time, without this new safeguard mechanism of damage control, and there were many social conflicts and contradictions. Now, should a significant environmental accident happen, such as the very serious water contamination of the Songhua River in 2006, the responsible enterprise may go bankrupt in the face of the large compensation and substantial expenses required for pollution abatement. Ultimately, in these circumstances, the economic consequences of the damage to the environment would be transferred to the local government, which has to bear the financial losses in its own budgets. If the polluting enterprise had joined the Environment Pollution Liability Insurance, the compensation for victims would be covered by the insurance company. The bankruptcy of the enterprise could be avoided and the financial burden of the government would be alleviated, meeting the needs of all three sides.

Strengthening public involvement in combating climate change

China is a developing country with a population of 1.3 billion. Public participation is of great importance in coping with climate change. China's National Climate Change Program not only requires governments at all levels to "improve public awareness as an important task", but also demands that "non-governmental organizations and civil society groups play an active role, to promote participation in mitigating global climate change by the general public and community".

Giving priority to scientific innovation

With the unveiling of China's National Climate Change Program, 40 ministries and departments, including the Ministry

of Science and Technology and the National Development and Reform Commission, published "China's Scientific and Technological Action on Climate Change" (CSTACC) on 14 June 2007, aiming to improve scientific capabilities comprehensively in response to climate change. Through the implementation of CSTACC, by 2020, China will greatly advance its innovative capabilities in tackling climate-change, and achieve breakthroughs in key technologies with independent intellectual-property rights for controlling GHG emission and mitigating climate change. These will be widely supportive of social and economic development.[9]

In recent years, important progress has been made in scientific/technological innovation in the field of climate-change mitigation in two major aspects. First, energy-saving and emission-reduction technologies have been developed much faster. That is the traditional response to climate change, where the focal point and core idea are to cut down emissions of greenhouse gases, such as carbon dioxide.

A second aspect of technology innovation has been attracting much attention. Currently, many scientists in the world, including in China, are conducting important research in a new direction, away from the traditional means of emissions reductions. Some of these new methods have been put to practical use, but much more can be done.

As we know, the total annual volume of carbon dioxide discharged by mankind is nearly 30 billion tons, but the amount used is only about 0.1 billion tons. After the traditional use and treatment of that 0.1 billion tons, that carbon dioxide will be discharged again into the air in the equivalent amount. If the carbon dioxide could be transformed into useful chemical raw materials, the situation would be totally different. Professor Tian Hengshui and his colleagues in East China University of Science and Technology invented a new way of exploiting carbon dioxide by synthesizing it into dimethyl carbonate, a "green" chemical raw material. This technology has permitted industrial production of a series of raw materials for pesticides, pharmaceutical

9 "For the first time, China published China's Scientific and Technological Action on Climate Change (CSTACC)", Wenhui newspaper, 2007, 6, 15.

intermediates, and methanol gasoline. All these products have attractive market value.

Here is another example. Climate change is believed to be the true reason behind the severe droughts in the lower Mekong basin in countries such as Thailand, Vietnam and in south-west China, in Yunnan and Guangxi provinces.[10] To deal with drought, the traditional methods are to build a dam, dig a well, desalinate sea-water, or transfer water from other places. In Africa, the Middle East and western China, where water resources are inadequate, these traditional methods of drought relief are not effective. Nowadays, scientists realize that the abundant moisture contained in the atmosphere equals eight times the sum total of all the rivers in the world. People can learn from the ability of certain living creatures, such as the spider, to absorb moisture in the air and "make" potable water.[11]

In Chile and Peru in South America, a new technology of "water production by intercepting mist" has been introduced in some villages. The entire project consists of a mist-intercepting network used for absorbing moisture and a water-treatment plant. By imitating the spider's cobweb, the intercepting network is aligned in the area where the mist forms most easily. When the fiber materials of the intercepting network have absorbed enough moisture, the water drops, then flows into troughs underneath the network and then to the water-treatment plant. Such a project can provide 10,580 liters of water per day.[12]

In a country like China with huge amounts of CO^2 emissions, the economy is developing quite rapidly while environmental technology lags far behind. China needs its own ways of solving the problem of climate change, such as shaping new ways of dealing with drought in addition to more traditional approaches.

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10 In early 2010, Pich Dun, secretary general of the Kampuchea national Mekong river committee, said that research by the committee indicated that the drought in countries such as Thailand and Vietnam had been caused by the early ending of the monsoon season, and that the severe drought in Yunnan in south-west China was also due to climate change.

11 The sieve of the cobweb is moist with hydroxyl acid, which has strong hydrophilic capability and can easily absorb the moisture in the air and retain a strong adhesive force for a long time.

12 "Science and technology brings about new water resources", Digest Newspaper, 2010, 4, 3.

Developing a low-carbon economy

After the industrial revolution and the information revolution, the low-carbon economy is set to change the world economy. Low energy consumption and zero-emission will become the mainstream. Until now, the world economy and global infrastructure, including manufacturing technologies and facilities in many countries, have relied on the high consumption of fossil fuels. By 2030, this situation needs to be changed greatly. The establishment and operation of the low-carbon economy has changed the rules of the game in many fields of the world economy; many "countries and cities independent of fossil fuels" have emerged.[13] Many fossil-fuel-consuming enterprises will also change their equipment and management systems in line with the new standards on energy-saving and emission reduction. What is involved in a low-carbon economy not only relates to the global climate-change issue, but also to the different aspects of social, economic and political affairs in the world.

To measure the development level of a low-carbon economy, it is necessary to set up a standard first. Some experts suggest taking "carbon productivity"[14] as a criterion; they believe that "carbon productivity" includes the indexes of both "low-carbon" and "economic development", and can act as the "core standard" for evaluating a low-carbon economy.[15]

Correspondingly, the concept of a carbon emissions index – an "individual carbon emission calculator" – dominates academic thinking at present. According to the "calculator", the carbon emissions of a Chinese white-collar worker per year are about 2,000 tons, while those of an equivalent worker in the US are much higher.

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13 "Hot debate on low carbon economy: the incoming of green times", *International Study Periodical*, Chinese Institute of International Studies, Beijing, 2006.

14 Carbon productivity refers to the productivity of GDP per unit of carbon dioxide, or GDP carbon-dioxide average, which has a kind of reciprocal relationship with carbon-dioxide emission intensity per unit of GDP. In line with the emission-reduction target set by the Fourth Assessment of IPCC, global carbon productivity must be doubled every 10 years over 40 years in order to cut the carbon-emission ratio by 50% compared with the index in 1990, and carbon productivity should be doubled 15 times by 2050.

15 See "Green GDP Times: please carefully calculate carbon productivity", Wenhui newspaper, 2009, 8, 27.

The concept of a low-carbon economy represents a new development trend of the world economy. The establishment of a low-carbon economy is a gradual process, and needs the close cooperation of the international community.

China's position on climate-change response and international cooperation

Most discussion of China's position on climate-change and international cooperation relates to whether or not China will undertake more mandatory emissions-reduction obligations. In fact, international cooperation on climate change involves much more in terms of contents and channels than simple targets in which multi-approaches are needed.

China highly values international cooperation and actively participates in international climate cooperation

China was an early signatory of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer, which was adopted in Vienna on 22 March 1985 and came into effect on 22 September 1988. China submitted the instrument of accession on 11 September 1989 and the treaty came into effect in China 90 days after that. By ratifying the treaty, China took an important step in strengthening its participation in international cooperation on climate change, more than 20 years ago.

The Montreal Protocol on Substances that Deplete the Ozone Layer is a global agreement enacted to implement the Vienna Convention. It aims to control ozone-layer-depleting substances specifically, and became effective on 1 January 1989. It was adopted by China on 20 August 1992. The Montreal Protocol set a clear timetable for the elimination of substances that deplete the ozone layer; it also stipulated provisions on technology transfer.

China is also a signatory of and participant in the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, the Bali Island Conference, the Bali Roadmap, the UN Climate Change Conference in Copenhagen, and other

related agreements. At those conferences, China always adhered to the principle of "Common but Differentiated Responsibilities", requesting developed countries to take the lead in reducing GHG emissions and provide funds and technologies to developing countries, to help them to improve their capabilities for responding to climate change. From the beginning of the industrial revolution to the 1950s, the total volume of carbon dioxide discharged by developed countries accounted for 95% of the sum total of CO^2 emission. In the 50 years from 1950 to 2000, emissions by the developed countries still accounted for 77% of the sum total of CO^2 emitted. In this context, the major obligation to reduce emissions should be borne by developed countries and the obligation of their continuing responsibility to reduce their discharges in the second commitment period after 2012 should be regarded as an equitable arrangement.

On the other hand, we take note of the increasing proportion of GHG emissions in total global emissions originating in developing countries, especially the emerging powers, including China. In accordance with the Kyoto Protocol, as a developing country, China would undertake no specific obligations on emissions reductions. But, as a responsible country, China has been taking serious measures to cut both energy consumption and GHG emissions. In May 2007, China's National Climate Change Program put forward the target to reduce energy consumption per unit of the GDP index by 20%, compared with that of 2005, by 2010. According to data from China's National Reform and Development Commission, China's energy consumption per unit of GDP had decreased by 13% by the first half of 2009, compared with 2005. This commitment to reduce energy consumption per unit of GDP by 20% in the Eleventh Five-Year Plan (2006-2010) is expected to be achieved; the total reduced emissions in China will be equivalent to a decrease of 1.5 billion tons in carbon dioxide over those five years.[16] At the Copenhagen Climate Change Conference summit in December 2009, the Chinese government announced that China would cut carbon-dioxide emissions per unit of GDP by more than 40%-45%, compared with 2005, by 2020. That target will be included in

16 "China announced for the first time the clear goal of greenhouse gas emission reduction". Xinhuanet, 2009, 11, 26.

the mid and long-term national economic and social development plan as a binding index. Chinese Premier Wen Jiabao emphasized at the Copenhagen Climate Change Conference that the Chinese target for GHG emission reduction was a voluntary action, taken in the light of its domestic circumstances, and represented a responsible policy towards the Chinese people and all human beings. China had not attached any condition to the target, or linked its execution to the reduction target of any other country. "We will honor our words with real actions to realize or even surpass the target regardless of what results will be concluded at the conference," he said.[17]

China participates positively in environmental and climate cooperation in international multilateral institutes and regional organizations

The United Nations Environment Program (UNEP) is one of the most important partners for China in the sphere of multilateral environmental cooperation. Since 1973, China has been a council member of the UNEP committee. Established in 1989, the Global Environment Fund (GEF) started to run formally in 1994. As one of the sponsor nations, China is both a recipient and donating country of GEF.

For a long time, China, the World Bank and the Asian Development Bank have engaged in fruitful cooperation on the environment and climate change.

In Asia, China is actively involved in and promotes environmental and climate cooperation under the "Ten plus One" and "Ten plus Three" mechanisms, and is pushing for the establishment of a tripartite ministerial meeting on the environment, involving China, Japan and South Korea. In addition, China successfully held the first Greater Mekong Sub-Region (GMS) Environment Ministers Meeting in 2005, at which cooperation programs such as the sub-regional biological diversity protection corridor were set up.

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17 Yang Tianxin, "Climate Change and Energy Protection Issues", *International Problems Study Periodical*, Chinese Institute for International Studies, Beijing, 2009.

Promoting bilateral environment and climate cooperation

China adopted the approach of "walking on two legs, pushing forward comprehensively" (where the expression "walking on two legs" indicates bilateral cooperation) in regard to international environmental cooperation. Within the framework of international conventions and agreements, China not only attaches importance to cooperation with international institutions, multilateral organizations and regional mechanisms, but also to bilateral cooperation on the environment and climate change with certain countries. It thus sees bilateral environmental cooperation as a necessary supplement to political, economic and cultural cooperation with those countries. Chinese cooperation on the environment and climate change with the United States, the EU and Japan is increasingly essential.

Rapid development on climate cooperation and the resolution of conflicts of interest between China and the United States

With the taking of office of Barrack Obama's administration, China-US cooperation on climate change has developed rapidly. Since 2009, the two nations have engaged frequently in dialogue on climate issues. In July 2009, a Memorandum of Understanding to Enhance Cooperation on Climate Change, Energy and the Environment between China and the United States was signed during the first round of the China-US Strategic and Economic Dialogue (SED) in Washington DC. Some experts believe that the overall framework of pragmatic cooperation between the two countries in responding to climate change has since been firmly established.[18]

The rapid development of cooperation on climate issues between China and the United States illustrates the existence of complementary interests on climate issues. Climate change, the need to develop highly efficient and clean energy, and environmental protection are common challenges faced both by China and the US. The establishment of a framework on

18 Zhang Lijun, "Chinese government takes positive action to deal with climate change", *International Problems Study Periodical*, Chinese Institute for International Studies, Beijing, 2010.

climate cooperation between the two sides is conducive to discussion and communication on strategies and policies on climate change, to identifying and formulating pragmatic solutions to achieving a low-carbon-economy transformation, and to successful international negotiations, joint research, exploitation, application and transfer of technologies relating to climate change. For many American enterprises, China is a potentially massive market for low-carbon-economy goods and services and presents a huge business opportunity for them. American experts estimate that 30% of global orders for energy-saving and environmental-protection equipment in the next five years will come from China, with a market value of US$300 billion. The United States has obvious technical advantages in the exploitation of new energy, safe coal mining, and promotion of a broad energy mix, all of which are skills that China needs.

Although climate cooperation between China and the United States has developed rapidly, it has not changed the US position of demanding that China commit to rigid obligations on emissions reduction, and to having a mandatory target, together with the developed countries after 2012. At the Copenhagen conference, the United States pledged to reduce GHG emissions by 17% by 2020 from a base of 2005 emissions. At the same time, the US demanded that both China and India make firm commitments on emissions reduction, and threatened retaliation through protectionist measures by the US Congress if the two countries refused to cooperate. Meanwhile, Japan and Canada listed the climate-change issues as the important component in bilateral environmental cooperation, and regarded emissions reduction as a "condition precedent" for providing funds and technology transfer.

Climate change cooperation between China and EU

In comparison with other developed entities, the EU has several distinctive characteristics in the area of climate change. First, it has early on adopted a "green standard" with regard to management systems, laws and regulations. For example, the German government has been regulating the textiles and

garments manufactured and sold domestically since the end of the last century, stipulating that cloth materials, coloration, dyeing and finishing, printing, safety control and recycling must conform to the German "green" environmental protection standard. Secondly, the EU is the only group of OECD countries that is actually reducing GHG emissions. Thirdly, in March 2007 EU countries passed the climate change and energy package program proposed by the European Commission, and is seeking to ensure an EU economic transformation involving higher efficiency and lower emissions, and to take over the commanding height of the world economy in the period of the post-industrial revolution. Fourthly, the EU has committed itself to cut 20% of its GHG emissions by 2012, compared to 1990. If other major countries/regions take similar actions and agree to deepen emissions reduction to 30%, total emissions reductions in the world would total an estimated 60% to 80% by 2050.

The EU early on established a climate-change partnership with China. In September 2005, the two sides released a joint declaration on climate change and established a bilateral partnership in response to climate change. This partnership provided a mechanism for the adoption of strategic perspectives on climate change and for the establishment and achievement of common goals. Currently, a consensus has been achieved between the two sides that priority should be given to pragmatic cooperation in energy efficiency, energy-saving, and new and renewable energy.

Strengthening climate cooperation with Japan

In 2004, China and Japan established a bilateral consultative mechanism in response to climate change. The two sides have since carried out four rounds of consultations. During Chinese President Hu Jintao's visit to Japan in May 2008, China and Japan issued a joint declaration on climate-change cooperation, in which the two sides affirmed their commitment to the goals and principles of the UNFCCC and the Kyoto Protocol. China and Japan believe that these are the appropriate and effective frameworks for international cooperation in response to climate change. The two sides

reiterated that, according to the principle of Common but Differentiated Responsibilities and particular capabilities, developed countries should take the lead in reducing GHG emissions and provide funds and technical transfer to developing countries, so as to support them in fulfilling their commitment to the UNFCCC. Japan reaffirmed its target of reducing GHG emissions by 6% between 2008 and 2012, as defined in the Kyoto Protocol, as well as its target for emission reductions after 2012.

In particular, both China and Japan stressed the importance of strengthening pragmatic cooperation on scientific research, exploitation and technology transfer and on climate-change mitigation and adaptation.

Promoting economic and environmental cooperation with sub-regional countries

The Greater Mekong River, which flows from China through Myanmar, Laos, Thailand, Kampuchea and Vietnam, links the six countries together in a sub-region. In the Greater Mekong Sub-Region (GMS) Economic Cooperation Program launched by the Asian Development Bank in 1992, environmental cooperation holds a very important position.

As the major founding nation of the GMS, China has always abided by the spirit of harmony, coordination and win-win principles, actively engaged in sub-regional environmental cooperation, and promoted the implementation of a series of programs, including sub-regional environmental poverty reduction, capacity-building, a biodiversity corridor, etc.

Because of the growing importance of climate change, China held an environmental workshop at the 13th conference of the GMS in Guilin, Guangxi province in China in June 2007, so as to undertake "The Preliminary Feasibility Studies on Carbon Balance Transportation Corridor" and "The Preliminary Feasibility Studies on Risk and Fragility of Climate Change of GMS", both of which have been incorporated into the "New Concept" section in the conference's final resolution.

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China is only too aware of the dramatic evolution of its rapidly changing energy balances and its relatively limited range of options to satisfy its growing need for secure, affordable, clean energy. Its lack of sufficient domestic options forces it to rely ever more heavily on imports of oil and gas, which China feels adds a security risk that must be managed. Its opportunities to manage the higher exposure to foreign-origin supplies are to diversify those sources and the types of energy deployed. The strong Chinese interest in renewable energy and electric vehicles reflects as much a desire to insulate sectors of its economy from imported energy as it is a component of a sustainable-energy future driven by concerns about global warming. Things are moving faster in China than China's ability to build the necessary oversight institutions, but even more difficult for China is its limited ability to project its policy decisions beyond Beijing and Shanghai to the far-flung provinces and villages of China.

How China confronts these challenges and its success in doing so has implications for the rest of the world in short-term markets, medium-term supply tensions and longer-term sustainability. As difficult as it may be to understand what is going on in a country of 1.5 billion souls, it is essential that we do so. This book will hopefully contribute in some small way to that end.

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