The Story Behind the Boom:
International and Domestic Sources of Influence on Chinese Renewable Energy Policy-Making

by

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Table of Contents

List of Tables ................................................................................................. 4
List of Terms .................................................................................................... 5
Chapter 1: From Laggard to Leader - China’s Recent Explosion in Renewable Energy ........ 7
  Structure of the Thesis .................................................................................. 13
Chapter 2: Powering the Future - Foreign Agendas, Domestic Priorities, and the Shaping of
  Chinese Energy Policy ................................................................................ 18
  Foreign Pressure and the Salience of International Norms ......................... 19
  Cases of Developmental States .................................................................. 26
  Conclusion: China and the Motive Behind Renewable Energy Development .... 33
Chapter 3: The Development of China’s Energy Sector From 1949 to the Present .......... 37
  Introduction .................................................................................................. 37
  China’s Energy Sector from 1949-1979 ..................................................... 38
  Reform of the Energy Sector ...................................................................... 48
  2000-Present: High Growth and Environmental Crisis .............................. 58
  Sectoral Overview of Current Production and Consumption Figures ........... 63
    Coal ............................................................................................................ 63
    Oil ............................................................................................................. 66
    Nuclear Energy ......................................................................................... 68
    Hydro-Electricity ..................................................................................... 69
    Renewables ............................................................................................. 70
  Conclusion .................................................................................................... 73
Chapter 4: The Effects of International Pressure on China’s Domestic Policy-Making .... 74
  The UN Conference on the Human Environment ....................................... 76
  The Vienna Convention for the Protection of the Ozone Layer .................. 81
  The UN Conference on Environment and Development ......................... 87
  The United Nations Framework Convention on Climate Change ............... 94
  Examples of Internationally Supported Renewable Energy Projects .......... 98
  Conclusion .................................................................................................. 102
Chapter 5: Domestic Problems, Renewable Energy Solutions ............................... 105
  China’s Energy Policy-Making Actors ....................................................... 107
  Energy Security .......................................................................................... 112
  Rural Electrification .................................................................................... 117
  Employment and Economic Growth ........................................................ 123
  Conclusion .................................................................................................. 128
Conclusion: The Convergence of International and Domestic Pressures ......................... 131
Contributions to the Literature ....................................................................................... 134
Policy Recommendations ............................................................................................... 138
Conclusion ..................................................................................................................... 140
References ..................................................................................................................... 143
**List of Tables**

3.1 Electricity Generation and Installed Capacity (1949-79) 43
3.2 Percentage Composition of Primary Energy Production (1949-79) 44
3.3 Primary Energy Use in China by Energy Type (1957-2006) 61
3.4 Total Energy Consumption in China by Type (2006) 64
3.5 China’s Electricity Generation by Type (1987-2007) 64
3.6 China’s 2020 Targets for Alternative Electricity Sources 71
5.1 China’s Crude Oil Imports by Source (Thousand Barrels per Day) Total 3,568 114
List of Terms

Electricity: A form of energy characterized by the presence and motion of elementary charged particles generated by friction, induction, or chemical change.

Electricity Capacity/Installed Generating Capacity: The maximum load of electric power, commonly expressed in megawatts (MW), by which generators, turbines, transformers, transmission circuits, stations, or systems are rated.

Electricity Sector/Industry: A label for the industries involved in sale and production of electricity, including its production, transmission, import and export. An equivalent term is the power sector/industry.

Electricity Generation: The process of producing electric energy or the amount of electric energy produced by transforming other forms of energy, commonly expressed in kilowatt hours (kwh) or megawatt hours (MWh).

Electric Power: The rate at which electric energy is transferred, measured by capacity and commonly expressed in megawatts (MW).

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world’s convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means to accomplish tasks. Electrical energy is usually measured in kilowatt hours, while heat energy is usually measured in British thermal units.

Energy Source: Any substance or natural phenomenon that can be consumed or transformed to supply heat or power. Included are petroleum, coal, natural gas,
nuclear, wood and waste, electricity, wind, sunlight, geothermal and water movement.

An equivalent term is fuel.

**Energy Sector/Industry:** A comprehensive label for the industries involved in the production and sale of energy, including extraction, manufacturing, refining, and distribution.

**Fossil Fuel:** Any naturally occurring organic fuel originating in the Earth’s crust, such as petroleum, coal, and natural gas.

**Photovoltaic Cell:** A specialized semiconductor diode that converts visible light into direct current by utilizing the photovoltaic effect.

**Renewable Energy Resources:** Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

**Thermal Power Plant:** An electricity generation plant in which the prime mover is a turbine rotated by high-pressure steam produced in a boiler by heat from burning fossil fuels.
Chapter 1: From Laggard to Leader - China’s Recent Explosion in Renewable Energy

“China’s history suggests a long, deeply entrenched tradition of exploiting the environment for man’s needs, with relatively little sense of the limits of nature’s or man’s capacity to replenish the earth’s resources. Attitudes, institutions, and policies were rooted in and supported by traditional concepts and philosophies such as Confucianism that promoted man’s need to overcome nature in order to utilize it for his own benefit, while the relatively eco-friendly philosophies of Taoism and Buddhism made limited inroads in the consciousness of the Chinese people and leaders.”


Under the guidance of Mao Zedong, the country’s first leader following the establishment of the People’s Republic of China in 1949, the Chinese population undertook massive campaigns aimed at securing the Communist Party’s control over the social, political, and economic lives of its citizens, developing the country from its relatively backward stage, and vaulting it to the forefront of international power. The Great Leap Forward, arguably one of the most significant of the numerous mass campaigns waged by Mao, was initiated to rapidly industrialize China’s overwhelmingly rural economy and produce levels of industrial goods like iron, steel, and cement on par with the United States and Great Britain. Unfortunately, Mao’s campaign ended in disaster, producing a famine which killed an estimated 16-40 million people1 and wreaked havoc on the natural environment. For example, as part of the Four Pests campaign people were told to eradicate rats, flies, mosquitoes, and sparrows. The program’s success in eliminating sparrows, however, led to a huge increase in the amount of locusts, thereby exacerbating the famine. Mao’s belief in

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Man’s ability to struggle against nature to use it for his own needs, though leading to the disasters wrought by the Great Leap Forward, reflected a larger cultural disposition towards the natural environment which remains today.

After the series of economic reforms initiated by Deng Xiaoping in the late 1970’s, China began to achieve Mao’s dream of rapid industrialization. Indeed, since 1980 China’s economy has grown an astonishing 800%! While China’s economy has developed with incredible speed, the nation’s disposition towards the natural environment remains rooted in the past. According to the World Bank, China is home to 20 of the top 30 most polluted cities in the world and though the government has devoted an increasing amount of time and attention to the country’s growing environmental crises, economic development has made concerns about the natural environment a very low priority.

Illustrative of the government’s growing awareness of the problems caused by environmental deterioration and its relative dismissal of their importance, in 2006 the State Environment Protection Agency and the National Bureau of Statistics released the Green GDP Accounting Study Report of 2004. This report provided information about how China’s environmental problems have negatively affected the country’s economic growth by calculating the monetary losses to that year’s GDP due to environmental degradation. This report estimated that the total loss to the country’s

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4 On March 28, 2008 the State Environment Protection Agency was upgraded to the Ministry of Environmental Protection, a cabinet-level ministry.
2004 GDP was 3.05% of total economic growth, representing a staggering $66 billion, including the costs of water, air, and solid waste pollution, and pollution accidents.\(^6\) Importantly, it is recognized that this calculation represented a rather conservative estimate, with the World Bank having previously estimated the figure to be closer to 8-12% of GDP.\(^7\) Indeed, the report, itself, admits that the results “only represent the environmental pollution cost, without accounts of costs of natural resources depletion and ecological damage,” rendering this accounting result representative of “only a fraction of ultimate green GDP calculation result.”\(^8\)

Nevertheless, this tremendous loss to the country’s economy due to environmental pollution provides a significant reason to pursue greener policies such as renewable energy. Despite this considerable evidence that the country’s economic development is increasingly threatened by environmental degradation, this reporting of the Green GDP was the only one ever published and the policy was discontinued shortly thereafter.

Given China’s largely dismissive attitude towards environmental issues, therefore, the country’s recent emergence as a global powerhouse in the production of renewable energy technology comes as a great surprise. The government devotes serious time and money to cleaning up after particularly dangerous environmental crises, such as the numerous clean-ups of the Huai River after its contamination with 38 billion gallons of highly polluted water in July 2001.\(^9\) However, the tremendous

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\(^7\) ibid
amounts of money and the promulgation of numerous policies and laws regarding the development of renewable energy are unmatched in almost any other environmentally-minded effort. And these efforts of promoting renewable energy, unlike efforts to reduce the pollution generated by the country’s industries, have paid off enormously. China now ranks second in the world behind the United States in terms of total installed wind power capacity\(^\text{10}\) and leads the world in its production of solar photovoltaic (PV) technology.\(^\text{11}\) Unthinkable even a decade ago, China has now become a powerhouse in the renewable energy field. Though the country uses a relatively small amount of renewable power in its current energy mix, the government’s initially ambitious targets have proven too conservative as China breached its 2010 wind power target two years early and is set to achieve its 2020 target by 2012.\(^\text{12}\) Considering the country held only 4.1 MW of wind power capacity in 1990 while it boasts 6300 MW of installed capacity as of 2008\(^\text{13}\), this achievement is remarkable.\(^\text{14}\)

In a context where environmental concerns have consistently received low priority, what can explain this recent explosion in environmentally-friendly renewable energy technology? This thesis seeks to answer this question by investigating two potential sources of influence on China’s domestic policy-making regarding renewable energy and the environment. First, as China has increasingly participated with the international community since its self-imposed isolation under Mao it is


\(^{13}\) Ibid 6

possible that, as an international consensus has developed regarding the need to protect the natural environment and promote policies characterized as “sustainable development,” China has found itself pressured to address its own negative contributions to the global commons. Most recently, this debate has occurred in the form of climate change negotiations and the desire to limit countries’ emissions of greenhouse gases. Has concerted international pressure on China, now the world’s largest emitter of such gases, succeeded in influencing the government to reduce its emissions through the production of renewable energy?

Alternatively, China’s embrace of renewable energy may result not from the technology’s potential environmental benefits, but rather from other positive political, economic, or developmental consequences. With China’s export-led economy based mainly on its production of manufactured goods, selling wind turbines and PV cells to meet the growing demand in developed countries would provide increased employment opportunities and add to the national wealth. Perhaps China’s development of renewable energy is merely another tactic towards achieving the government’s goal of maintaining rapid economic development. Have domestic development interests been the driving force behind the expansion of China’s renewable energy sector?

Beyond answering a curious anomaly in an important international issue, the puzzle of China’s development of renewable energy is important for several additional reasons. As severe as China’s environmental crisis is, this situation is by no means unique to the People’s Republic. While the more developed countries have been engaging in efforts to improve the efficiency of their use of scarce resources and
protect the natural environment from needless exploitation for some time, the arguments for such actions find little resonance in developing countries. Furthermore, as the vast majority of countries in the world are still considered “developing,” the efforts of these nations to reach “developed” status will require a tremendous amount of natural resources and will generate ever larger amounts of harmful greenhouse gas emissions if they follow the same methods of development as the currently developed nations employed. Therefore, discovering the driving force behind China’s development of renewable energy may provide clues as to how other nations may be persuaded to similarly invest in technologies and develop policies which can mitigate the negative environmental consequences of their development. If the major source of influence is external, what specific methods have made the international community’s efforts at promoting policy change in China so successful, and can they be reproduced in other countries? Or, if the major source of influence is domestic, do similar forces supportive of renewable energy exist in other developing countries and, if they do, can they be marshaled to positively affect domestic policymaking?

Another important consequence of investigating this puzzle is that, by seeking to understand the sources of influence and causes for action which have facilitated the development of renewable energy in China, we can develop a greater understanding of how policies are produced, debated, and ultimately accepted or rejected in non-democratic countries. Most studies on the interactions of states with one another in international negotiations, such as Robert Putnam’s Diplomacy and Domestic
Politics: The Logic of Two-Level Games,\textsuperscript{15} have focused on democratic states and the need to reconcile the foreign policy strategies of the executive branch with domestic interests as advocated by the legislature, civil society, interest groups, etc. Scholars need to develop a better understanding of how these theories of international relations apply to non-democratic states. Also, while numerous theories exist seeking to explain the logic and processes behind domestic policy-making in democratic countries,\textsuperscript{16} our understanding of similar processes in authoritarian nations is lacking. By investigating the possible domestic sources of influence behind China’s promotion of renewable energy a clearer picture of the actors and forces at work in China’s policy-making, and perhaps by extension those of other non-democratic countries, may be revealed.

**Structure of the Thesis**

This thesis will be presented as follows. In the next chapter, several examples of different theories and studies relevant to determining the major sources of influence on China’s development of renewable energy will be presented and explored. The first section will survey various works regarding how nations interact with one another and the international community and whether/how nations are compelled to negotiate, produce, sign, ratify, and comply with international treaties. The next section will review examples of how governments actively involved in the development of the country’s industrialization and economic expansion have


succeeded in using “developmentalist” tools to meet their objectives. By analyzing these theoretical works and empirical examples, the investigation of China’s development of renewable energy can be placed in its proper theoretical context.

Chapter 3 will present a historical outline of the development of China’s energy industry from 1949 to the present. Although it will highlight some important facts and events during Mao’s leadership, the bulk of the chapter will investigate the radical changes to the energy industry which have occurred following Deng’s economic reforms. These reforms radically reshaped the country’s economy and society, with the energy industry as no exception. Through the gradual processes of separating party and government functions and the corporatization of the energy industry, China’s energy policies and infrastructure underwent significant legal and structural changes which continue to affect the sector’s performance today. This chapter will end with a brief sectoral overview of China’s current energy mix.

Chapter 4 will begin the investigation into the extent to which the international community has compelled China to change its policies in ways more amenable to a growing international environmental consensus. By examining China’s participation in three major environmental conventions, including the 1972 United Nations Conference on the Human Environment, the 1985 Vienna Convention for the Protection of the Ozone Layer, and the 1992 United Nations Conference on Environment and Development, the capacity for the international community to advocate for and affect China’s domestic environmental policy-making will be illustrated. While these conferences do not directly concern renewable energy, the nature of China’s participation and compliance with its treaty obligations provide
prime examples of how the country has reconciled international norms with domestic policies and what strategies have proven especially effective in inducing policy change within China. Thus, we can analyze China’s recent actions and policies regarding the international debate over climate change, which often include recommendations by climate change experts that countries develop renewable energy resources, to determine whether the international community can claim responsibility for China’s recent development of renewable energy. The chapter will argue that international pressure has been highly effective in the areas where such pressure has been supplemented with significant financial contributions, such as those directed toward the construction of large-scale wind farms as well as small scale wind, hydro-electric, and solar power stations for rural applications. Conversely, this pressure has been ineffective in those environmental policy areas, such as conservation, where financial aid has been lacking.

Chapter 5 will examine the alternative explanation that China’s government has chosen to pursue renewable energy according to domestic, rather than internationally generated, rationale. Beyond being environmentally-friendlier alternatives to traditional fuel sources such as coal and petroleum, renewable energy technologies also represent unique tools for addressing some of China’s most enduring political, economic, and developmental problems. Specifically, this chapter will discuss how renewable energy has been utilized to address three longstanding issues: energy security, rural electrification, and employment creation. By demonstrating how renewable energy is providing at least partial solutions to these problems, the chapter demonstrates the ways that the country’s leadership has
actively promoted the development of a thriving renewable energy industry regardless of any international pressure.

Finally, this thesis will conclude by attempting to synthesize the observations made in Chapters 4 and 5 in order to present a clear answer to our puzzle. It will be shown that both international efforts aimed at achieving China’s compliance with environmental accords as well as the government’s recognition of the powerful role renewable energy plays in solving domestic issues have significantly influenced China’s development of renewable energy. Drawing on the model introduced in John W. Kingdon’s book *Agendas, Alternatives, and Public Policies*, the existence of these external and internal sources of influence have converged to create a “policy window” which has facilitated the promotion and adoption of policies designed to expand China’s renewable energy industry. Thus, while the international community cannot take full credit for inducing this positive policy change, China likely would not have achieved its current high level of renewable energy development without sustained international political pressure and multilateral financial and technical assistance. Similarly, without the existence of pressing domestic problems and the recognition that renewable energy can play a vital role towards their resolution, China’s leaders would have had significantly less incentive to pursue policies favorable to this industry.

Furthermore, this understanding of China’s “boom” in renewable energy provides important insights into the interaction of non-democratic states with the international community and their domestic interests, as well as a better understanding of how policies arise, are debated, and accepted or rejected in
authoritarian governments. The lessons learned from China’s renewable energy development have important implications for the promotion of environmentally-friendly policies in other developing nations and may provide powerful tools for those seeking evidence for the compatibility of renewable energy and economic development.

Why is China investing so much in renewable energy? The government has relied upon its vast coal reserves to satisfy the majority of its energy needs throughout its development so why would China now invest billions of dollars in this new, competing, technology? Indeed, since Mao Zedong’s development drive following the establishment of the PRC, economic growth has overshadowed all other concerns especially that of environmental quality. With abundant coal reserves and an apparent willingness to sacrifice the country’s natural environment to meet its development needs, the active promotion of a sector designed to decrease the country’s environmental footprint by supplementing, and perhaps ultimately supplanting, traditional carbon-intensive energy sources seems to defy the logic of China’s development over the past fifty years.

This chapter will examine two specific explanations for China’s recent investment in renewable energy: 1) the influence exerted by the international community, which has increasingly become more concerned with environmental degradation as it relates to climate change, and 2) a recognition by government officials that a renewable energy industry will serve the country’s political, economic, and developmental goals and contribute significantly to the country’s GDP.

This chapter will outline possible explanations for the development of China’s renewable energy industry, specifically investigating theories presented in the literature regarding the capacity of international norms, institutions, and actors to influence domestic policy-making as well as the reasons for and ability of a development-minded government to actively promote particular industries through a
variety of developmentalist strategies. The chapter will begin with an examination of the literature concerning the power of international pressure on domestic policy-making while relating these theories to the rise of renewable energy in China. It will then proceed with the alternative perspective that domestic rather than international factors may be primarily responsible for the growth of this industry.

**Foreign Pressure and the Salience of International Norms**

Despite nation-states’ unremitting defense of their sovereignty and inherent distaste for actions or agreements which curtail their capacity to make their own decisions, the economic integration of the world through the processes of globalization has made international cooperation a necessity. These processes have thus facilitated a gradual movement of some powers formerly in the domain of sovereign states to international regimes and the international community. Undoubtedly, international regimes and norms influence domestic policy-making, but the effects of such influence vary depending on the particular issue and the process through which the pressure is applied.

In his work, *Diplomacy and Domestic Politics: The Logic of Two-Level Games*, Robert Putnam argues that the international negotiator plays an important role in mediating between international and domestic political pressure. Putnam’s two-level games theory describes the politics of international negotiations as operating in two levels: the national level, where domestic groups pressure the government to adopt policies favorable to their interests; and the international level,

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where national governments seek to maximize their ability to satisfy domestic pressures while minimizing the unfavorable outcomes of foreign negotiations.\textsuperscript{18} Putnam distinguishes two strategies, reverberation and synergistic linkage, which maximize the potential for a negotiator to achieve his/her goals. Reverberation is the ability of international pressure to bolster silent allies within the domestic arena of the target nation, while synergistic linkage refers to a negotiator linking previously unrelated issues within his counterpart’s and/or his own domestic arena that may allow for a broader compromise on these areas.

Expanding on Putnam’s argument, Leonard Schoppa (1993) introduces two additional strategies that foreign actors can use to influence domestic policy. Participation expansion recognizes that policy-making outcomes are affected by changes in the number of participants, whereby new participants create new zones of possible agreement to the advantage of one of the parties. The second strategy, alternative specification, captures how foreign demands for specific policy action can highlight policy alternatives that may not have been considered in the absence of foreign intervention.\textsuperscript{19}

In the context of the US-Japan Structural Impediments Initiative talks, the US attempted to expand elite participation by turning previously domestic issues, such as the country’s macro-economic policies, urban land policy reform, and the uncompetitive relations between firms in \textit{keiretsu} groups, into issues with great bilateral consequences, thereby moving the policy debates from isolated sub-governmental units to involve a wider range of government actors, some of whom

\textsuperscript{18} Ibid 434

were more sympathetic to the American demands. Similarly, the US negotiators sought to increase the general public’s participation by involving the Japanese media, which embellished the drama between the US and Japan, to bring public opinion to bear on the government’s decision-making. Schoppa argues, however, that participation expansion only works when the issue in question is not already so politicized that all actors have formed inflexible opinions. Furthermore, this strategy is more likely to succeed when the general consensus is already moving in the direction proposed by the negotiator.

If international actors have indeed been effective in pressuring the Chinese government to promote a renewable energy industry, than strategies of reverberation, synergistic linkage, participation expansion, and alternative specification have likely been employed. To evaluate the existence and effectiveness of such strategies, this thesis will identify the relevant international and domestic actors while analyzing the issues debated between them and the outcomes of these negotiations. In particular, I will focus on several examples of China’s participation in international environmental conventions, including the United Nations Conference on the Human Environment, the Vienna Convention for the Protection of the Ozone Layer, and the United Nations Conference on Environment and Development, as well as the treaties and protocols which resulted from such events as instances where international actors worked together to pressure China to adopt certain policies related to environmental issues and renewable energy. I will also examine the political dynamics within China and among Chinese and foreign elites around the time of these events to determine

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20 Ibid 379
21 Ibid 381
whether international pressure had any influence on Chinese policy related to renewable energy.

The US, Japan, the World Bank, and the UN represent some of the major international actors which have attempted to influence China in mitigating the negative environmental impact of its development. Domestically, the main targets of foreign pressure likely include various government ministries, including those of Foreign Affairs, Land and Resources, Environmental Protection, Health, and the National Development and Reform Commission (NDRC) to name just a few, as well as environmental non-governmental organizations (NGOs) and the general public. One particular organization, the China Council for International Cooperation on Environment and Development, serves as a channel by which the international community can make policy recommendations to the Chinese government, and therefore should provide valuable information in this area. By analyzing the commercial and governmental linkages between these international and domestic actors I will determine which strategies were utilized and whether they have succeeded in influencing China’s renewable energy policy.

In addition to particular strategies, the context of the negotiation can affect how receptive a country is to foreign pressure. Andrew P. Cortell argues that the domestic salience or legitimacy of international norms as well as the structural context in which the policy debate occurs can be crucial determinants in affecting the success of international pressure. He identifies five factors which affect a norm’s salience in the domestic context: a “cultural match”, the national political rhetoric, the material interests of domestic actors, domestic political institutions, and socializing
forces. In the context of China’s renewable energy policy, these factors may affect the country’s receptivity to international environmental norms and, therefore, the development of a domestic renewable energy industry. For example, evidence suggests that there may be a cultural mismatch in the area of renewable energy. Chinese leaders continue to insist that the efforts to force China and other developing nations to decrease their emissions of carbon-dioxide are unfair due to the overwhelming historical emissions by industrialized countries. Thus, it may be the case that the “recognition of an international norm might be likened to cultural imperialism or colonialism and cause domestic resistance or rejection.”

President Hu Jintao’s numerous pronouncements describing China’s economic growth as representing “sustainable development,” however, easily fit into Cortell’s criteria regarding the existence of a norm in the national discourse. “As authoritative officials set precedents for themselves and their successors, their normative pronouncements become part of the society’s legitimating discourse, establish intersubjective understandings and expectations at both the domestic and international levels, and constrain policy options.” While Hu’s declarations of sustainable development may appear as mere speechifying, his use of that concept indicates an acceptance of a norm that values sustainable development and has raised expectations regarding China’s willingness to confront the negative consequences of its rapid development.

23 Ibid 74
24 Ibid 76
Illustrating the power of “socializing forces,” Kim Reimann explains how Japan’s “rise as an economic superpower in the 1980s put pressure on it to prove its worth as a member of international society and to show that it follows international norms.” Similarly, China’s economic rise has led many in the international community to demand that the country take a larger stake in pressing international issues, prompting the Chinese leadership to announce its intentions as a “responsible power.” Thus, China’s interest in being viewed favorably by the world may constitute an important socializing force, which Cortell defines as “the process by which new members come to adopt a society’s preferred ways of behaving.”

To determine the impact international norms have had in influencing the growth of China’s renewable energy industry, the factors enumerated by Cortell will be identified and evaluated, especially those regarding the national political rhetoric, the material interests of domestic actors, and the domestic political institutions as they are more amenable to objective observation. The following chapter will evaluate statements by prominent government officials and relevant domestic actors, such as energy firms and environmental groups, to demonstrate if international norms have any salience and, therefore, if they can claim responsibility for the growth of the renewable energy sector.

Another way in which international pressure can affect domestic policy-making is through the provision or withholding of foreign investment. In his analysis of the judicialization of politics in Egypt, Tamir Moustafa explains how the Egyptian

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26 Ibid 81
government, due to its record of nationalizing large sections of the private sector in the 1950’s and 1960’s, struggled to encourage foreign investment into the country.\textsuperscript{27} To allay investor fears and provide a legitimate and legal means for them to ensure the safety of their assets, the government created the Supreme Constitutional Court. While the Court succeeded in encouraging greater foreign investment flows into the country, it has provided an important avenue for opposition parties, human rights groups, and political activists to credibly challenge the Egyptian regime. In this way, the government was pressured by international investors to establish an institution which concurrently allowed for opposition forces to damage the regime.

Similarly, China has accepted generous investments by international actors such as Japan, South Korea, the World Bank and the UN in areas meant to improve the environmental sustainability of its development. As with the Egyptian case, China consequently has been forced to tolerate the creation of environmental NGOs so as to appear supportive of the environmental issues that the international community is funding. Since the Chinese government likely would not have pursued these projects on its own, such investments represent a clear example of foreign pressure influencing domestic policy. Therefore, similar investments by international actors in renewable energy projects will be presented to illustrate their impact on the Chinese government’s promotion of this industry at large.

Cases of Developmental States

While some scholars attribute great authority to international actors, others are more skeptical, arguing that major policy initiatives, such as China’s huge investment in renewable energy, are primarily motivated by domestic political and economic concerns and only peripherally related to international pressure. Due to its authoritarian nature, the Chinese government is eminently capable of actively developing particular industries for political and economic goals entirely independent of foreign influence. Therefore, the development of a renewable energy industry may represent just another example of deliberate efforts by the government to grow an industry that it sees as useful for national economic growth. This conception of government promoting national economic growth through the direct intervention by political, bureaucratic, and moneyed influences on a country’s economy is generally termed the “developmental state.” Discussed authoritatively by Chalmers Johnson and Meredith Woo-Cummings in their respective works, the developmental state is often used to describe the methods of economic planning undertaken by Japan and other East Asian Tigers, such as South Korea and Taiwan, in their pursuit of economic strength and competitiveness. By learning from the experiences of its economically successful East Asian neighbors, in many respects China has adopted the rationale of the developmental state to achieve its own economic prowess.

Scholars have now amassed considerable evidence that China often promotes particular industries in pursuit of developmental goals, such that positive

environmental outcomes may just be welcome byproducts of economic growth-oriented policies rather than policy goals in and of themselves. For example, Marc Blecher found that the local government of Xinji went to extraordinary lengths to establish a Fur and Leather Trading Center (FLTC) in the city to replace the failing municipality-owned heavy industries established during the Mao period, and in the process created very strict environmental regulations for the new industry. Xinji officials used the full array of financial and administrative resources as well as incentives including deferred taxes on new investment property, reduced land use and urban services taxes, a five-year holiday on payment of the real estate tax, and even offered to re-classify one member of an investor’s family from a rural to urban resident to promote this new industry.

As the local government actively sought out entrepreneurs to set up shop in the new FLTC, city officials realized that, in order to make Xinji a leader in the industry, they must minimize the adverse environmental consequences associated with its production processes. For example, city officials banned the creation of new small plants which contributed to pollution and created a comprehensive waste-management strategy while using a combination of incentives and punishments to ensure that enterprises purchased the latest technology required to guarantee minimal environmental damage. Importantly, this care towards the environment was not the result of concerted foreign pressure. Rather, these actions represented a purely

30 Ibid 375. The re-classification from rural to urban residency (a designation from China’s hukou system) represents an important upgrade in terms of the social services available to the individual. Rural residents generally receive little to none of the social services offered to urban residents, and face other types of overt discrimination.
rational economic decision to allay the concerns of local investors and nearby residents which would negatively impact the commercial success of the FLTC. Such environmental regulation represents one example of the close governmental supervision and involvement in all aspects of the FLTC. Contrary to popular belief, such direct participation by the government was actually welcomed by many entrepreneurs who viewed it as an effective way of promoting a reputation for good quality and reliability among the fur and leather enterprises.31

Blecher’s analysis of Xinji officials’ development of the FLTC provides an important example of a government’s efforts to nurture a particular industry. The willingness and capacity of the municipal government to encourage the development of the fur and leather industry lends credence to the possibility that similar government actions, in an effort motivated solely by the priority to encourage economic growth, may be responsible for the development of a thriving renewable energy industry in China.

In a similar case, Alfred P. Montero’s study of Brazil’s pro-development policies emphasizes that the process of privatizing steel was not instigated by fiscal constraints or neoliberal policy strategies advocated by international organizations such as the IMF and World Bank, but was instead purely a domestic political process. Montero’s analysis rejects the arguments which “portray Latin American states as being pushed and pulled by external and fiscal necessities,” and instead asserts that the variance among the Latin American countries’ responses to severe economic constraints “suggests that domestic political interests shape reactions to external

31 Ibid 382
pressures.”\textsuperscript{32} In this case, the author argues that the privatization of steel was a “profoundly political process” undertaken so as to create “a stronger state, rid of patrimonial interests and endowed with a strategic sense for retooling the economy,” adding that “such ideas were neither ‘neoliberal’ in content nor designed by neoliberal ‘technopols.’”\textsuperscript{33}

Relating these arguments to the case of China’s renewable energy sector, the domestic political interests in China, which seek the maintenance of sustained economic growth and development, may be tempering the government’s reaction to foreign pressure regarding the need for environmentally sustainable practices. Official promotion of this sector, therefore, may have arisen solely from the rationale of domestic political interests encouraging economic development rather than in response to international influence. To evaluate this possibility, this thesis will seek evidence that officials were primarily concerned with the economic benefits of promoting renewable energy regardless of international pressure in this area by examining the relevant government ministries involved in renewable energy policy-making, their primary interests and priorities, and how these actors have sought to achieve their particular goals through the development of renewable energy.

One of the factors that complicate China’s economic development is its transition from a state-led to more of a market-oriented economy. Lawrence P. King and Aleksandra Sznajder examine the former Soviet satellite states’ transition and find that Poland was the most successful post-communist economy despite the fact that the government, rather than immediately relinquishing control over its economic

\textsuperscript{32} Ibid 29
\textsuperscript{33} Ibid 27
assets, maintained an important position in promoting the country’s economic
development and restructuring its major industries so as to make them more desirable
to potential buyers. Poland’s relative success resulted from “an interventionist and
developmental state which facilitated state-owned enterprise (SOE) restructuring
prior to privatization.” The authors explain that the Polish government initially
implemented numerous neoliberal policies advocated by the United States and
international organizations like the IMF and World Bank. However, the public
backlash against the negative economic impacts associated with such programs led
the government to reverse the majority of these policies and employ “controlled
liberalism,” which is “the use of a non-neoliberal state to create a liberal market
society (in other words, it accepts the neoliberal end point but significantly alters the
neoliberal prescription for getting there).”

Once again, this examination of state intervention reflected the importance of
domestic politics in affecting the receptivity of policy ideas originating from abroad
while demonstrating the state’s willful rejection of ideas which did not conform to the
domestic political consensus. The state resisted foreign pressure in deciding how to
restructure its economy, focusing instead on policies which converged with the
government’s domestic political priorities. The selective implementation of
international advice regarding strategies of economic development may also be
evidenced in China’s promotion of a renewable energy industry, where domestic

Organizational, World-Systems, and Social Structural Explanations of Poland’s Economic Success.”
American Journal of Sociology 112(3): 751-801. P.753
35 Ibid 771
political interests determine the capacity of foreign pressure to affect domestic policy outcomes.

The previous examples of the Xinji and Brazilian governments using state resources to actively promote and develop particular industries, as well as the Polish government’s selective implementation of foreign advice regarding its economic transition, illustrate the capacity of developmentalist governments to achieve their economic goals. Importantly, in the Brazilian and Polish cases, the domestic governments initiated their policies regardless and in spite of international actors which sought to influence their policy actions. For China, the growth of a renewable energy industry may represent such an instance where a developmentalist government has promoted a particular industry in order to meet its own economic and development goals irrespective of foreign interests. Though foreign pressure has indeed been applied on the Chinese government to decrease its environmental footprint, such pressure may have contributed relatively little to the official decision to promote a renewable energy industry.

If domestic political and economic issues constitute the major factors behind China’s development of renewable energy, than what explains the recent explosion of activity in this industry? In his book, *Agendas, Alternatives, and Public Policies*, John W. Kingdon seeks to explain the processes which lead to some issues being raised on the government agenda while others are neglected. Kingdon identifies three “process streams” flowing through the policy-making system which contribute to the identification, consideration, and resolution of various issues: problems, policies, and politics. These streams develop independently and according to their own rules, but
“at some critical junctures the three streams are joined, and the greatest policy changes grow out of that coupling of problems, policy proposals, and politics.”

Although Kingdon’s analysis focuses on agenda setting and policy-making in democratic countries, some of his conclusions may hold true for non-democratic states. Indeed, Kingdon’s conception of policy windows, which occur when “a problem is recognized, a solution is developed and available in the policy community, a political change makes it the right time for policy change, and potential constraints are not severe.” may apply to the case of renewable energy in China. While renewable energy technology, in the form of large and small hydropower, has been utilized in the PRC since its foundation, China’s recent promotion of rapid development in this sector may result from the opening of such a policy window. With international pressure raising the profile of environmental issues around the world, policy-makers in favor of renewable energy in China may be seizing the opportunity to promote such technologies as a solution to some of the country’s long-standing domestic problems.

In order to test the importance of domestic political and economic interests in shaping China’s renewable energy policy, this thesis will examine the complicated nature of energy policy-making as well as specific policies implemented by the government directed towards the development of the renewable energy industry. Also, if the rapid promotion of this industry has been motivated purely on the basis of its potential contribution to economic growth, which would therefore reflect the government’s major domestic political goals, then the leading enterprises in this

37 Ibid 174
industry should be showing considerable profitability or at least a trend towards economic success. Therefore, an analysis of the extent to which China’s renewable energy enterprises are generating significant revenue, as well as the success or failure of major renewable energy projects, is necessary.

Furthermore, while the renewable energy industry may be directed towards meeting a foreign demand so as to generate income for the national economy, it is important to examine the use of such technologies within China, itself. This will indicate whether or not the Chinese government has embraced the use of such technologies to solve potentially difficult domestic political and economic issues. Indeed, as China’s economic development brings greater standards of living to more of the population, concern for environmental degradation is expected to increase and demands for a “greener” development path are expected to grow ever louder. China has thus far permitted the establishment of environmental NGOs to appease foreign audiences and provide useful information regarding the state of the country’s environment and popular opinion in that regard. The growth of a renewable energy industry may, then, be motivated by the desire of the Chinese government to address, or at least appear to address, the growing popular concerns about the quality of China’s natural landscape.

**Conclusion: China and the Motive Behind Renewable Energy Development**

As the preceding sections have shown, foreign pressure can be applied to a state in various ways with a range of success depending on particular characteristics of both the origin and nature of the pressure as well as the particular political and
economic circumstances facing the country at the time. Though states are certainly subject to the norms of the international community and the demands placed upon them through their bilateral relationships, national governments maintain significant freedom of action when it comes to responding to such pressures. Furthermore, a country’s level of economic development plays an important role in determining the perspectives and priorities of the national government and general public, thereby influencing the receptivity to foreign pressure directed at various policy areas.

Indeed, the priority of economic development is often times an overriding factor in a country’s desire to conform to international norms and succumb to international pressure. Where such norms converge with the economic priorities established by the national government, the likelihood of a state accepting these norms dramatically increases. When such pressure conflicts with a state’s economic imperative, the ability for such pressure to be positively received decreases. However, a state may agree in principle with the goals espoused by international actors while disagreeing with the methods and pacing of policies required to meet such goals.

It is within this context that this thesis will seek to uncover the root causes of China’s rapid development of its renewable energy sector. The next chapter will offer an overview of the development of China’s energy sector in order to set the context for the more detailed discussions about the country’s renewable energy policies and industry that follow. China’s legacy of an overwhelming reliance on the dirtiest fuel source, coal, to power its development since its founding would make the growth of an industry which seeks to supplement, initially, and replace, eventually practices of
energy production which severely degrade the natural environment a distant possibility. China’s abundant reserves of coal give the country few reasons to search for alternative energy sources, especially when such sources are costly to produce and generate relatively unreliable flows of electricity. Yet, today China can boast a thriving industry consisting of a whole range of enterprises engaged in the production of renewable energy technologies, such as solar cells and wind turbines, which have grown to become global leaders in the field. This rapid development thus begs the question: Why has a successful renewable energy industry emerged in a country which has, for its entire history, placed economic development ahead of all other concerns, especially that of environmental quality?

To solve this puzzle, this thesis will utilize the essence of the theories introduced in this chapter to test two competing questions. First, to what extent was China’s decision to invest in renewable energy caused by international pressure (in the form of direct bilateral demands, a growing international consensus, and increased international promotion of norms regarding the importance of environmental conservation, protection, and sustainable development)? Second, has China’s decision to invest in this industry merely been a byproduct of its growth-oriented economic policies?

Ultimately, it will be shown that both international pressure and domestic political and economic priorities play an important role in explaining the development of the renewable energy sector. Specifically, while the international community has succeeded in raising environmental awareness in the Chinese government, it is the convergence of these pressures and domestic political and economic priorities to
which renewable energy can significantly contribute that has facilitated the
promulgation of policies promoting this industry. While China has largely resisted
pressure to address its environmental degradation in other ways, such as empowering
the Ministry of Environmental Protection to increase and enforce existing fines and
regulations against polluting industries, which would negatively impact economic
growth, its promotion of renewable energy must result from the convergence of
international pressure and the recognition that renewable energy can provide solutions
to some of the country’s greatest political and economic issues.
Chapter 3: The Development of China’s Energy Sector From 1949 to the Present

Introduction

The production of energy, be it from fossil fuels, nuclear power, or renewable sources, is vital to a country’s economic fortunes. Indeed, a nation’s energy industry is often valued and treated differently from other economic sectors due to the enormous impact that the state of energy production has on the economy at large. In the People’s Republic of China (PRC), a country whose economy has grown over 800% since 1980, the energy sector is of particular importance to the nation’s prospects for present and future growth. Much of this economic growth is immediately attributable to the series of reforms initiated under Deng Xiaoping and the realization that the ideologically-driven development policies utilized by Mao Zedong must give way to more pragmatic methods which embrace simple economic realities. This process of “reform and opening” gradually increased the influence of market forces throughout China’s economy, forcing and facilitating dramatic changes in the country’s economic structure. However, due to its strategic importance, reforms in the energy sector, despite serious inadequacies inherent in the state-run system, proceeded even more slowly and gradually than reforms in other areas. Though far from complete, the process of reform in the energy sector has resulted in a multitude of noticeable changes, both positive and negative, that define the current structure of China’s energy industry.

This chapter briefly traces the expansion of China’s energy sector from the founding of the PRC to the present day, focusing on both the bureaucratic and
economic changes which influenced the pace and nature of development in China’s energy industry. This abridged history explains both the nature of China’s energy structure as well as the political and economic influences that shaped its development in order to provide a context for the recent expansion of China’s renewable energy industry. The chapter will conclude with a look at current production and consumption figures of major energy resources as well as a preview of the factors which will play an increasingly important role in the sector’s continued expansion.

**China’s Energy Sector from 1949-1979**

China’s first encounter with electrical energy production occurred in 1882 when a group of Americans built the country’s first-ever thermal power plant in Shanghai. Over the next several decades, the major European powers drove the continued development of China’s energy resources and electricity-generation capacity as they invested in more power plants within their concession areas. Between 1882 and 1937, the Americans, British, Germans, French, and Japanese constructed a total of 461 power plants with an installed generating capacity of 630 MW, with 95% of these plants held in foreign hands. However, the Sino-Japanese War (1937-45) laid waste to China’s primitive power infrastructure, and this devastation was only exacerbated by the civil war that followed. Indeed, following its victory over the Kuomintang (KMT) in 1949, the Chinese Communist Party (CCP) faced enormous challenges in rebuilding the war-torn country.

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Under the direction of Mao, China’s leaders sought to develop and industrialize the country by following the Soviet Union’s development model which emphasized investment in the heavy industrial sectors. Consequently, the development of the energy sector involved concentrating on the already-established industrialized areas and serving the large-scale heavy industries. During the first 5 Year Plan (1953-57), China relied heavily on Soviet loans, technical assistance, equipment, and expertise to begin the construction of hydro-electric dams and increase its thermal generation capacity. Over this period, the rate of total primary energy production growth, which includes coal, crude oil, natural gas, and hydropower, averaged around 15%, an impressive accomplishment considering the recent foreign occupation, civil war, and the general technological backwardness of China at the time.\(^{39}\) This growth in energy production and the equally substantial growth in China’s heavy industry, however, proved unsatisfactory for Mao, who soon initiated the Great Leap Forward: a massive development plan which was supposed to propel China towards a utopian future in which it caught up to the level of development of the United States and then surpassed Britain.

Although the Great Leap Forward resulted in disastrous outcomes for the economy and population, the program succeeded, at least nominally, in several of its goals with respect to the energy sector. Indeed, official output statistics for the period between 1957 and 1960 record a dramatic growth in coal production, from 131 million tons to 397 million tons.\(^{40}\) It must be noted, however, that such statistics are of dubious quality given the desire of local government officials at the time to

\(^{40}\) Ibid
exaggerate output of all products, such as iron, steel, coal, etc., so as to please Mao and avoid demotion or worse. To meet his ambitious goals, Mao encouraged the creation of “backyard industries,” constructed in local communes for the production of industrial products such as iron, steel, cement, and fertilizer. Due to the increasing amount of energy required for this industrial production, many small hydro-electric power stations were constructed to supply local industries with electricity. Originally initiated as part of a massive water-conservation effort, the construction of hydro-electric stations began with “thousands of small stations with a total generating capacity of 900 megawatts … in 1958, and very ambitious plans were made for 1,000 megawatts in 1962 and as much as 2,500 megawatts in 1967.” These small hydro-electric stations were critical in supplying power to China’s rural regions and were generally constructed using entirely local funds and materials. The central government supplied funds only for assistance in design, the manufacturing of power generating equipment, and the training of operators.

Along with small hydro-electric stations, Mao encouraged the construction of small local coal mines to provide energy to the backyard furnaces producing iron and steel. In 1958 alone, the number of small local coal mines increased from 20,000 to 110,000 and supplied over 50 million tons of coal. However, the coal produced by these small scale and rudimentary mines was generally of poor quality due to the lack of coal preparation and washing facilities, thereby leaving a large proportion of incombustible matter to be burned with the coal. Using such unprepared coal

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dramatically decreases energy efficiency while increasing the pollutants emitted, and the problems with inadequate coal washing facilities continue to plague the industry today. As of 2004, only 22.2% of coal is washed, and over 90% of coal is consumed raw. Consequently, in 2005 the thermal power industry, which uses mostly unwashed steam coal, emitted 12.041 mega-tons (Mt) of sulfur dioxide, 3.467 Mt of soot, and 14,000 tons of industrial dust. By comparison, in 2005 the United States’ electricity industry emitted 9.38 Mt of sulfur dioxide.

Though the Great Leap Forward spurred the construction of large and small hydro-electric dams and facilitated a dramatic expansion in coal mining, Mao’s campaign proved disastrous for industrial development and for the country as a whole. Though exact figures are unknown, by the end of the campaign between 16.5 and 40 million people are estimated to have died from starvation. Furthermore, contrary to the expectations of “leaping” past the UK and the US, the cement, coal, iron, and steel produced by backyard industries were of such poor quality that they were often completely unsuitable for use. Furthermore, Mao’s encouragement of peasants to produce such useless industrial materials resulted in a massive diversion of labor from agriculture. With their attention focused on backyard industrial activities, few peasants were left to manage their farms, resulting in a nation-wide famine which killed millions of people. As the Great Leap Forward came to a close, the Soviet Union withdrew its aid from the Chinese Communist Party (CCP), leaving China without its primary source of investment, technical support, and expertise.

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Due to the enormity of the failures caused by the Great Leap Forward, many Party officials began to doubt the validity of Mao’s development policies. To ensure his continued control of the Party and country, just five years after the Great Leap Forward Mao launched the Cultural Revolution to eliminate apparently “bourgeois” elements in the Party bureaucracy and maintain the socialist road. The nation-wide social upheaval which followed was likely unexpected even by Mao, himself, as citizens turned against one another and towns and cities erupted in widespread violence. Though industrial production continued throughout the period, the development of the energy industry slowed considerably. Following Mao’s death in 1975 and further political struggles over the future leadership of the country, Deng Xiaoping eventually assumed control of China, and the development of the energy sector, and the country as a whole, was profoundly affected by the policies of reform and opening that Deng initiated.

During the period from 1949-1979, two factors greatly influenced the development of China’s energy industry: the political upheavals and the state of coal production. Though the annual growth rate of energy production over the three decades averaged 12%, the chaotic periods of the Great Leap Forward and Cultural Revolution substantially inhibited the continued growth in energy production. For example, while the rate of growth was 23% in the 1950s, in the 1960s and 1970s growth was significantly lower, averaging 4% and 10%, respectively. At the height of the Cultural Revolution in 1967, total energy output dropped by 27%.

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political struggles have had a marked impact on the country’s capacity for industrial growth, and the energy sector, as it is intimately connected to every aspect of industrial production, felt the effects of these struggles acutely. Such political battles continued under Deng and his successors as the departments and agencies responsible for managing and regulating the energy industry were used as tools to maintain power and support allies as well as eliminate the influence of potential rivals.

Table 3.1 Electricity Generation and Installed Capacity (1949-79)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Installed Capacity (GW)</th>
<th>Total Generation (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>1.85</td>
<td>4.3</td>
</tr>
<tr>
<td>1959</td>
<td>9.54</td>
<td>42.4</td>
</tr>
<tr>
<td>1969</td>
<td>21.04</td>
<td>94.0</td>
</tr>
<tr>
<td>1979</td>
<td>63.02</td>
<td>282.0</td>
</tr>
</tbody>
</table>


A second factor that held particular influence over the development and output of the energy industry as a whole was the state of coal production. Indeed, until 1957 the growth rate of total energy production was driven largely by that of coal production. As a percentage of total energy production, coal comprised 98.1% in 1949, 95.69% in 1959, and 83.15% in 1969.\(^{50}\) When the Cultural Revolution disrupted coal production and transportation, alternative forms of energy developed quickly to fill the need for more energy. During the Cultural Revolution, as chaos raged in the cities, rural villages continued to develop small hydro-electric stations to generate their electricity. Between 1965 and 1970 the installed generating capacity of small hydro-electric stations tripled, while the number of these stations increased from 26,000 in 1970 to 90,000 in 1979.\(^{51}\) Given China’s extensive exploitable hydro

\(^{50}\) Ibid

resources, estimated to be 378 gigawatts (GW)\(^{52}\) of which small hydropower resources account for 23\%,\(^{53}\) the development of hydro-electric generation was only natural. By 1981 hydropower represented 3\% of total energy production and nearly 21\% of total electricity generation.\(^{54}\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Crude Oil</th>
<th>Natural Gas</th>
<th>Hydropower</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>98.10</td>
<td>0.60</td>
<td>0.04</td>
<td>1.26</td>
<td>100.0</td>
</tr>
<tr>
<td>1959</td>
<td>95.69</td>
<td>2.37</td>
<td>0.46</td>
<td>1.48</td>
<td>100.0</td>
</tr>
<tr>
<td>1969</td>
<td>83.15</td>
<td>12.65</td>
<td>1.22</td>
<td>2.98</td>
<td>100.0</td>
</tr>
<tr>
<td>1979</td>
<td>70.10</td>
<td>23.61</td>
<td>3.00</td>
<td>3.29</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Along with an increase in the use of hydro resources, China’s crude oil production dramatically increased between 1960 and 1979. Following the confirmation of China’s oil reserves in the Daqing oil field in 1959, at the Fourth Session of the Second National People’s Congress in December of that year Premier Zhou Enlai declared that China had become self-sufficient in petroleum. China’s output of crude oil doubled between 1960 and 1965, and once again by 1969.\(^{55}\) During the period from 1950 to 1979, the average annual growth rate for petroleum output was 25.3\%.\(^{56}\) Over the same period, the share of crude oil as a percentage of total primary energy production increased from a mere 0.93\% to 23.61\%, accounting


\(^{55}\) Ibid 31

for nearly a quarter of all energy production. Indeed, for a time it appeared that the dramatic rise in oil production would change the pattern of energy growth from its dependence on coal. However, despite its status as a major oil exporter during the 1970’s and 1980’s, in 1993 China became a net importer of oil, reflecting the extraordinary energy demand of China’s growing economy and the lack of adequate refining capacity within the country. Thus, while coal has continued to supply roughly 70% of China’s total energy consumption since 1949, the development of other fuel sources, especially hydropower and petroleum, facilitated the gradual diversification of China’s energy supply.

Overall, in the first three decades following the establishment of the PRC, China’s energy industry experienced dramatic expansion and development. Between 1949 and 1979, China’s total electric generation rose from a mere 4,300 million kilowatt-hours (kWh) to 282,000 million kWh, representing an increase of 65.6 times. Furthermore, total installed capacity during the period increased from 1.85 GW to 63.02 GW.

Although this enormous growth represents an incredible achievement for Mao and China, numerous problems and imbalances have continued to plague the industry. Due to the great unevenness in the geographic distribution of China’s energy resources, the need to transport coal and transmit electricity over vast distances has seriously overburdened the inadequate railway and transmission systems. While the

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major energy consumption areas are concentrated along China’s coastal regions, which were the focus of many of the economic policies initiated by Deng, the major energy producing areas are concentrated in the northern and southern regions. The North, South-west, and North-west of China account for roughly 86% of the country’s total coal deposits, and the South-west alone accounts for 70% of the total exploitable hydro-electric potential.\textsuperscript{60} Due to China’s continental size, the distances from major coal production and consumption centers are immense. For example, coal travelling from Shanxi province, the largest coal producing province in China, to a power plant in Shanghai must travel roughly 500 miles by rail to Qinhuangdao Port in Hebei province, the largest coal shipping port in the country, where it is then shipped across the Yellow Sea to a Shanghai wharf.

The need to transport coal through the railway system adds further difficulties to utilizing the country’s energy resources. While coal output increased thirteen fold from 1950 to 1980, China’s railway mileage over the same time period increased only 1.4 times.\textsuperscript{61} The poor development of China’s railways seriously inhibited its capacity to efficiently utilize its coal reserves. For example, “the daily fueling of just one 1000 MW coal-fired plant requires five train-loads of coal, each transporting 1400 metric tons.”\textsuperscript{62} Due to both the energy inefficiency of China’s power plants and the inadequate level of the country’s rail infrastructure, coal thus occupies at least

40% of all railway cargo capacity in China. In this way, China’s energy reserves run counter to the distribution of the population and industrial activities, seriously complicating the country’s capacity to deliver energy to where it is needed most. The inadequacies of the energy sector and its capacity to meet the demands of the rapidly growing economy pose serious obstacles to China’s continued explosive growth. Chapter 4 expands upon this theme to show how these factors are influencing China’s recent development of renewable energy in the form of improving the country’s energy security.

When he assumed power following Mao’s death, Deng sought to rectify the economic imbalances caused by Mao’s ideologically-motivated development path through a series of widespread reforms which gradually withdrew the state from its direct planning of the economy, thereby allowing market forces to have influence over economic decisions. As these reforms were steadily introduced, the resulting growth in economic activity they facilitated dramatically increased the demand for energy in the country. To meet this rising demand and to continue its own development and expansion, the energy industry, too, underwent a series of reforms designed to improve the management, administrative regulation, production capacity, and sources of finance to fully modernize the sector and ensure the stable and reliable flow of energy to the population. The following section will illustrate the various reforms initiated by the CCP towards the energy industry, highlighting the changes in the bureaucratic structure, and the consequences such actions have had on the country’s energy production.

\[^{63}\text{ibid}\]
Reform of the Energy Sector

The series of economic reforms initiated by Deng Xiaoping had a manifold impact on China’s economy. This section will focus on those reforms related to the energy sector in particular. In 1978 at the Third Plenum of the Eleventh Central Committee China’s leaders agreed that, in order to promote stable and continued economic growth, the government must simplify the economic management system, gradually remove the state from direct planning, allow more managerial autonomy in firm decision-making, and permit market forces to have a greater impact on the economy. During this meeting, Deng expressed the goal of the new reforms as to achieve a “socialist market economy” through Four Modernizations: in agriculture, industry, technology, and defense. However, in order to achieve these modernizations the economy had to undergo important structural changes, and the resolution of serious imbalances within the energy sector was crucial to accomplishing these goals.

By the late 1970’s the energy sector’s capacity to deliver electricity to consumers had become seriously strained, resulting in severe power shortages across the country. In 1978, the estimated shortage of installed generating capacity was 10,000 megawatts (MW), representing 19.5% of total electricity demand, “while shortage of power generation was 40TWh [terawatt hours], 17.9 [%] of the total demand.”\(^{64}\) China’s leaders quickly realized that such shortages were highly detrimental to the country’s future growth and could compromise the potential success of the reform process. The numerous changes in the government structure

\(^{64}\) Ibid 55
with regards to the energy sector from 1949 to the present are essential in understanding the initial causes and ultimate consequences of the reform in this sector.

Under the Chinese Communist Party (CCP), the energy sector, as with all other economic sectors, was owned, controlled, and managed directly by the government. Consequently, the development of China’s energy sector lay subject to the changing focus of the Party in pursuing national economic development as well as the constant political power struggles which frequently produced reorganizations of various government agencies’ powers, personnel, jurisdiction, and purpose. Indeed, “since developments in the industry were decided by the government, with political benefits and costs the prime considerations, economic merits and efficiency were not significant issues, even though changes might have been triggered by economic demands.”65 For example, in 1958 the power and water ministries were merged to form the Ministry of Water Resources and Electric Power (MWREP). Though this merger partly resulted from a new emphasis on hydroelectricity borne out of the Great Leap Forward, this decision was largely motivated by Mao’s decision to remove critics of the Great Leap Forward from political power and replace technical specialists with supportive political generalists. Although this bureaucratic structure remained in place during the Cultural Revolution, the different styles of management for the power and water resources administrations, with the former being highly centralized and the latter decentralized, as well as the social and political chaos

65 Ibid 94
spawned by the Cultural Revolution greatly inhibited the capacity of the ministry to perform its basic functions.\textsuperscript{66}

Following the announcement of major economic reforms in 1978, MWREP was split again into the Ministry of Electric Power (MEP) and the Ministry of Water Resources (MWR) in order to begin rectifying the damage caused by severe power shortages. Once again the bureaucratic reorganization also had a political motivation. The separation served to “protect the position of newly returned allies of Deng while removing the opposition without appearing to demote them or to be launching another leadership purge.”\textsuperscript{67} The responsibility for energy policy-making and implementation was shifted yet again in 1980 to a new State Energy Commission, only to be returned back to the recreated MWREP in 1982 when the new Commission proved unable to carry out its responsibilities. The recreated MWREP, though successful as part of an effort to decrease the large and growing number of government ministries, once again failed to consider the consequences that such a merger would have on administrative and economic efficiency, and the overlapping and often competing missions of the water and power bureaucracies constrained the ministry’s capacity to promote either mission successfully.

In the early 1980’s, the main concern of MWREP was addressing the shortage of electricity supply which, with the economy growing at 10% annually, was seen as an obvious constraint on growth.\textsuperscript{68} Initially, government policy sought to alleviate the situation by actively encouraging the growth of the coal industry. However, with

\textsuperscript{66} Ibid 85  
\textsuperscript{67} Ibid 87  
output from the large state-owned mines already at a high level, the government’s policies focused on promoting the growth of local mines. These actions proved very successful, and “the township and village-run mines emerged as the major force in coal production.”

For example, while the state had long dictated the price of coal at rates well below the marginal costs of production, in 1982 the price of coal produced by local mines was de-controlled, thereby allowing local mines to meet the excess demand at prices which allowed them to stay afloat. By 1984, as a result of these pricing changes, market prices for local coal had risen to as much as eight times the price of coal from state mines, and between 1982 and 1985, “coal production from local mines increased by about 12 per cent a year, compared to 5 per cent for state mines.”

Due to the painful energy shortages caused by the low state-controlled prices, consumers were willing to pay higher prices for coal in order to meet their increasing need for energy.

The clear success of these pricing changes motivated further price reform in the other energy sectors. In the mid-1980s three types of price reform were implemented in the coal industry at large: “for the first time the price depended on the quality of coal; the controlled price for coal was increased in local currency terms so that it quadrupled in ten years; and an increasing percentage of coal output could be sold at market prices.”

For the oil sector, in the early 1980’s a “dual-track” pricing system was introduced, under which “producers were allowed to sell their above-

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quota products in the market and the regions could import petroleum products using their own foreign exchange reserves.\textsuperscript{72} With these reforms in place, by 1994 nearly all coal was sold through wholesale markets at prices close to international levels, and by the early 1990’s two-thirds of oil products were being sold at high or unregulated prices.\textsuperscript{73}

In 1988, however, the government structure with regards to the energy industry changed again when the power industry was removed from MWREP and placed under the newly created Ministry of Energy (MOE). Charged with the “planning, financing, and management of coal, oil, electric power and nuclear power industries, and [controlling] the entire technical side of power generation, transmission, and distribution development,” the MOE held responsibility for all aspects of the energy industry. The bureaucratic changes at this time resulted from the continuing power struggles between the reformers, who sought to continue the process of withdrawing the state from direct management of the economy, versus the conservatives who believed that, while Mao’s political movements interfered with the proper functioning of economic planning, nothing was fundamentally wrong with the planned economy, and therefore sought to recentralize the government’s investment policies.

Like earlier restructurings, however, the MOE struggled to maintain control over the various subsectors it controlled as each seemed to be plagued by its own sector-specific problems. Thus, in 1993 the MOE was disbanded and replaced with

Ministry of Coal and the recreated Ministry of Electric Power (MEP). The stated purpose of the MEP was to “transform government function from direct economic management to indirect macro administration, to promote the development of independently managed electricity enterprises, to achieve the required changes of the relevant legal framework and policies, and to encourage diversification in investment sources.”

At the same time, as part of this shift towards the creation of independently managed enterprises, the five regional power administrations, which each covered several provinces, were converted into regional power groups: “Huabei (Northern China), Dongbei (North-Eastern China), Huadong (Eastern China), Huazhong (Central China), and Xibei (North Western China).”

The recreation of the MEP reflected a shift in government thinking towards economic management, which favored the corporatization of state-owned enterprises (SOEs) as an alternative to outright privatization. Whereas privatization would require the state to relinquish ownership of important industries to the private sector, through corporatization the state retained control of these enterprises while injecting them with market discipline by holding them accountable for their profits and losses. In December 1993, this program of corporatization was codified with the Company Law, which sought to

“(1) restructure the organization and management of the state-owned enterprises; (2) address serious, chronic, and seemingly intractable problems of inefficiency; (3) to promote competition and productivity; and (4) to remove the state from detailed management of business operation.”

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75 Ibid 17

The corporatization of the electricity sector became the MEP’s major administrative focus, and as the MEP carried out this function the ownership structure of the sector changed dramatically. By 1996 over 4,000 electricity companies existed, of which “some are set up by provincial governments, some are set up by local governments, some are set up by Central government, some are set up by private entrepreneurs, and some are joint-ventures with foreign interests.” Furthermore, as China opened up its power industry to foreign direct investment (FDI) in the early 1990’s, these sources of finance served to discipline firms in the power industry and partially relieve the country’s chronic power shortages. As shall be demonstrated in chapter 3, the influx of FDI has had a profound impact on the development of China’s energy sector in general and the renewable energy sector in particular.

In 1996, the State Council granted permission for the MEP to begin the process of corporatizing itself, and by 1998 the MEP was disbanded with its functions assumed by different government agencies, including the State Development Planning Commission (SDPC), the State Economic and Trade Commission (SETC), and the Ministry of Land and Natural Resources (MLNR). Based on the old powerful State Planning Commission, the SDPC was now mainly responsible for long-term planning, project approval and pricing. The SETC, which “merged six former state ministries including coal, electric power, petroleum, and chemical industries, metallurgical industry, machine-building industry and internal trade,” became the main regulatory body in the energy sector. The MLNR, “created in 1998, is responsible for the planning, management, protection and sustainable use of all

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natural resources." Also, in 1997 the State Power Company of China (SPCC) was established as an independent economic entity which assumed the MEP’s former responsibilities in the management of enterprise functions. The SPCC was created “as a state-owned, vertically integrated electric power utility corporation” which inherited all the assets in the power industry formerly controlled by the MEP, with a registered capital of 160 billion yuan and the responsibility to “manage over 80 per cent of the assets of China’s power industry, and [the industry’s] 1.64 million employees.” Additionally, the five regional power groups and six provincial power companies became its direct subsidiaries. With the successful corporatization of the power industry through the creation of the SPCC, by 1996 the balance of supply and demand for electricity had for the first time been generally achieved.

Although the process of corporatization had fundamentally altered the structure of the power industry, several obstacles remained which required the continued focus of the government. The persistence of the state-owned, vertically integrated monopoly represented by the SPCC prevented the flow of overseas capital from entering the market, thereby constraining continued development of power generating capacity. Also, following the devolution of investment authority in the 1980’s, numerous independent power providers (IPPs) emerged which, while not privately or foreign owned, consisted of producers not wholly owned by the central government. In the second half of the 1980’s, the main sources of finance other than

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the central government’s budget allocations were provincial and other levels of government. Indeed, by the late 1980s “60% of new investments came from non-central government sectors,”\textsuperscript{81} with “approximately one-third of all power plant investment nationwide…raised at the local level.”\textsuperscript{82}

These IPPs were often more efficient than the state-owned plants due to their financial dependence on sources of investment beyond the central government. Therefore, as IPPs negotiated with the state-owned utilities to sell their power, elements of competition were gradually introduced which changed expectations of the power industry: “power was now regarded as a commodity to be bought and sold on the market, rather than allocated by the government.”\textsuperscript{83} While such competition is essential to force electric companies to become more efficient, several problems appeared as the IPPs were forced to compete with power producers that shared ownership with the power grids to which they both sought to sell their power. Generally, “local [grid] networks preferred to use the electricity of plants in which they had invested or who were within their own system instead of electricity from independent power stations.”\textsuperscript{84} This, along with the development of varying and competing rules and regulations between different provinces, not only served to scare potential investors away from the market but also threatened the process of development for the entire power sector.

\textsuperscript{81} Ibid 15
To address these issues, in 1996 a joint study by the MEP and the World Bank proposed two reform measures for the power industry: “ownership reform through commercialization and corporatization; and structural reform by unbundling segments of the power industry.” With the processes of corporatization and commercialization already underway, the government adopted the Single Purchasing Agency model to achieve the separation of generation and transmission networks as called for by the study. In China, this model has four characteristics:

“a single buyer or purchasing agent [was] created in a specific geographic area; independent and affiliated generators located inside or outside the geographic area competing for the right to make power sales to this single buyer; the single buyer owning transmission facilities within this area and also performing the dispatch function; and the single buyer as the only seller of power in the specified geographic area to affiliated and independent lower-level power supply (distribution) enterprises, such as county, prefectural and municipal power enterprises.”

For China, this monopsonistic (single buyer) system not only represented a minor conceptual shift, but also offered numerous benefits, including greater competition in generation, the ability of the state to accommodate social policy obligations, and the maintenance of government control over technology and fuel selection. Although reform in this area continues, the separation of generation from transmission and distribution has proven essential in introducing competition amongst power providers, which in turn produces greater efficiency in their production, attracts

87 These include the obligation to supply, diversity of fuel sources, environmental regulation of emissions, uniform pricing across areas with unequal costs, rural electrification, conservation programs, etc.
foreign capital and technology to the sector, and provides a rational system that encourages a stable supply of power to consumers.

2000-Present: High Growth and Environmental Crisis

As the government has continued to withdraw from direct control over the energy industry, the need for an independent regulator of the power sector has become increasingly apparent. As previously mentioned, three major institutions share the majority of responsibilities for the power industry: the SPCC, the SDPC, and the SETC. The Ministry of Environmental Protection (MOEP), responsible for regulating emissions and other forms of pollution affecting the natural environment, also shares some responsibility in overseeing the energy industry. However, the entrenched interests of each agency and general bureaucratic inertia has so far prevented the creation of a comprehensive and independent agency, resulting in each institution with responsibility over the sector competing for power and conflicting over policy-making and implementation.

In an effort to create a rational regulatory system, in April of 1996 the Electric Power Law of the People’s Republic of China became effective. This law, at least nominally, seems to establish a two-tier organizational structure in which:

“The administrative department of electric power under the State Council shall be responsible for supervision and control of the electric power industry throughout the country. The departments concerned under the State Council shall be responsible for supervision and control of the electric power industry within their own limits of authority.
The department in overall charge of the economy under the local peoples government at or above the county level is the electric power administration department of that administrative region and shall be responsible for supervision and control of the electric power industry there.\textsuperscript{89}

Thus, it appears that the SETC is responsible for supervision and control at the national level\textsuperscript{90} while local administrative departments are responsible for supervision and control within their administrative regions. However, reflecting the brevity and vagueness of Chinese law in general, the law fails to specify what “supervision and control” entails and by what mechanisms such supervision and control is to be performed. Indeed, “what is most crucially missing is the institutional basis for regulation – who regulates, what powers and responsibilities these entities have, and what the process of regulation is.”\textsuperscript{91} While the passage of the Power Law represented a step forward towards the realization of a rational, effective regulatory regime, more action is required in order to fully clarify the actors responsible and mechanisms available to ensure the successful and legal management and development of the power sector. Despite persistent calls from policy experts for the recreation of an overarching Ministry of Energy, stiff bureaucratic opposition has prevented any serious development in this area, as detailed in chapter 4.

Although the process of reform in China’s energy sector is far from complete, the numerous administrative changes in the PRC’s bureaucracy


\textsuperscript{90} At the time the law was created, this responsibility would have fallen to the MEP. However, as mentioned earlier, the MEP was dissolved in 1998 and the majority of its power was transferred to the SETC.

have had a clear impact on the nature and performance of the power industry. During the thirty year period since 1980, the power industry has been transformed “from a static highly centralized, government managed organization, unable to respond to the demand for electricity, to a very dynamic diversified field of organizations with a high ability to respond to the country’s industry power needs, at internationally viable costs.”

Indeed, the reforms affecting the power sector have had significant effects on the industry’s capacity to meet the electricity needs of the country. For example, between 1978 and 2007 China’s total primary energy consumption increased from 400 Mt of oil equivalent (Mtoe) to nearly 1,820 Mtoe, representing an average annual rate of 5.3%. To meet this seemingly insatiable demand, China’s electricity generation grew at an average annual rate of 9.7% between 1990 and 2004, while its installed capacity over the same period increased from 130 GW to 442 GW.

However, as energy demand has rapidly increased, with total energy consumption growing 71.5% between 2001 and 2006 and averaging 11.4% per year, China has reverted to its traditional dependence on its dirtiest and most abundant fuel source: coal. While coal’s proportion to total energy production has remained around 70% throughout most of the PRC’s history, between 1980 and 2006 coal’s share has exceeded that average, rising from

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69.4% to 76.7%. The continued burning of coal, the dirtiest fuel source, has greatly damaged China’s environment, especially its air quality, and the CCP has faced greater pressure from its citizens and from the international community to address the manifold environmental problems now plaguing the country and their impact on the global environment.

Table 3.3 Primary Energy Use in China by Energy Type (1957-2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hydro-power</th>
<th>Natural gas</th>
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<th>Coal</th>
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In 2003 electricity generation accounted for 43% of China’s total emissions. Of those emissions attributable to the electricity sector, coal-fired generation accounted for 97%. According to the former State Environmental Protection Agency, emissions of sulfur-dioxide (SO2) “have roughly paralleled the increase in coal consumption because of the lack of sulfur control measures,” creating a situation in which “ambient concentrations of TSP [total emissions

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of particulates] and SO2 in many Chinese cities are among the highest in the world.\textsuperscript{98} The problems in air quality are just one aspect of the multitude of environmental crises affecting China. To name just a few of these, China faces a “rapid depletion of land through conversion of agricultural land to commercial uses; pollution of all kinds, notably water pollution from industrialization and population growth, and air pollution from automobiles and the burning of coal; degradation of soil, forests and grasslands; increased soil erosion…”\textsuperscript{99} The growing domestic and international pressures to address these environmental emergencies has motivated the government to take action towards pollution control and, in the power sector, encourage the development of cleaner, renewable energy resources.

On January 1, 2006, China’s Renewable Energy Law, the legal basis of the promotion of renewable energy, became effective. This law seeks to “promote the development and utilization of renewable energy, improve the energy structure, diversify energy supplies, safeguard energy security, protect the environment, and realize the sustainable development of the economy and society.”\textsuperscript{100} The National Development and Reform Commission (NDRC), which took over the functions of the SETC in March 2003, is designated as responsible for managing the development and utilization of renewable energy and for setting medium- and long-range targets for their use in total energy


production. Although China’s government has embraced the imperative of sustainable development, which includes a growing use of renewable energy technology, the country’s rapid economic development cannot rely on these technologies to fuel this growth alone. Unfortunately, barring some unforeseen development, coal will continue to be the foundation of China’s energy production.

This section has attempted to describe the series of institutional changes in the Chinese governmental structure with regards to the energy sector and the resulting effects such structural changes have had on the power industry’s productive capacity. The following section shall present a brief overview of the current state of production for the main energy sectors: coal, oil, nuclear power, hydro-electricity, and renewables.

**Sectoral Overview of Current Production and Consumption Figures**

**Coal**

As previously mentioned, the coal industry represents the foundation of China’s energy production and consumption. With China’s explosive growth in GDP over the past few decades, coal has maintained its dominant share of total energy production and, in order to fuel the country’s continued growth, coal’s dominance will likely continue into the future. To meet expected demand for electricity, “China will have to install as much as 860
GW of additional generation capacity by 2020,” of which “more than 60 percent…will comprise coal-fired power plants.”\textsuperscript{101}

Table 3.4 Total Energy Consumption in China by Type (2006)

![Energy Consumption Chart]

Source: EIA International Energy Annual 2006  
http://www.eia.doe.gov/emeu/cabs/China/Full.html

Table 3.5 China’s Electricity Generation by Type (1987-2007)

![Electricity Generation Chart]

Source: EIA International Energy Annual  
http://www.eia.doe.gov/emeu/cabs/China/Electricity.html

According to the International Energy Agency, between 1998 and 2007 China’s coal production increased from 1,429 million short tons to 2,795.5 million short tons, while consumption over the same period increased from 1,392 million short tons to 2,772 million short tons. Despite China’s massive domestic resources of coal, increasing demand for high-quality coal has required China to begin importing coal from abroad. In 2006, China imported 38.25 Mt of coal (over 42 million short tons), an amount twenty times larger than that in 2000.\textsuperscript{102} As an example of how much coal the Chinese economy consumes relative to other countries, in 2003 China, alone, accounted for 31% of total global coal consumption.\textsuperscript{103}

While China’s abundant reserves of coal make it a natural source of fuel, there are several problems associated with the burning of coal. First, the uneven geographic distribution of China’s coal reserves presents great difficulties for the transport of coal and the transmission of electricity to consumption centers. With 77% of the easily accessible, less polluting and low-sulfur content coal reserves located in the interior of the country, coal and the electricity it produces must cover vast distances in order to reach the major energy consumers in the coastal provinces. Indeed, though the provinces of Shanxi and Inner Mongolia possess over 60% of China’s coal, together they represent only 4.5% of the population and account for only 3.3% of GDP.\textsuperscript{104}

These geographic, population, and economic disparities present major problems regarding the utilization of China’s coal reserves.

Second, the widespread use of coal creates numerous environmental problems, specifically in releasing huge amounts of TSP and SO2 into the air causing nationwide health problems amongst the population. Finally, the inefficient use of coal resulting from low thermal efficiencies causes high levels of pollution together with higher electricity generating costs. The lack of adequate coal preparation facilities reduces the quality of coal used for electricity generation, meaning that each gram of coal produces less energy than a gram that has been sufficiently washed. Though these problems are apparent to both the Chinese government and population, the continued use of coal to meet the economy’s energy requirements is inevitable, and the development of clean-coal technologies, as well as the construction of coal preparation facilities, is imperative.

Oil

Despite the initial excitement following the confirmation of oil reserves in China’s Daqing oilfield in 1959, compared to the country’s coal resources China’s oil reserves are far more modest. According to the U.S. Energy Information Agency, as of 2009 China’s total proven oil reserves amounted to around 16 billion barrels. Although during the 1980’s China was one of the largest oil exporters, in 1993 the country became a net oil

importer “as a result of stagnating domestic oil production and the growing demand for road transport fuels and petrochemical feedstocks.” Indeed, as China’s population has grown wealthier, its demand for energy-intensive products, like automobiles, has increased accordingly. Between 1990 and 2003, the number of registered motor vehicles increased almost six times, from 6.2 million to 36 million. If current trends in oil consumption continue, it is estimated that China’s oil imports will be 120-182 million tons by 2010, a level almost twice as high as the level of its imports in 2003.

Following the process of corporatization that occurred in China’s energy sectors, two national oil companies control the country’s oil exploration and production: the China National Petroleum Corporation (CNPC) for onshore and the China National Offshore Oil Corporation (CNOOC) for offshore. Each corporation acts as both regulator and operator in their sector, and foreign companies may undertake exploration and production only under production-sharing agreements with the relevant company. Both the CNPC and CNOOC have sought to become international oil players, undertaking exploration, production, and service operations in Latin America, South-East Asia, and the Middle East. For China’s oil refining and marketing, SINOPEC was created in 1983 to bring order to the refining, petrochemicals, and domestic marketing sectors. However, as China’s domestic supply of oil has failed to meet demand, “the government faces the

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choice of whether to improve security of supply by continuing to increase refinery capacity at a time of capacity excess in East Asia or by importing ever-larger quantities of product.” As explained in chapter 4, this growing dependence on imported oil represents a major concern of the Chinese government, and provides one of the major arguments for the development of domestically produced resources such as renewable energy.

According to the Energy Information Agency, between 1998 and 2008 China’s production of crude oil increased from 3,198.19 thousand barrels per day (bpd) to 3,790.18 thousand bpd. Its production of petroleum increased from 3,301.74 thousand bpd to 3,973.13 thousand bpd over the same period.

**Nuclear Energy**

The development of China’s nuclear power program did not begin until the early 1980s. In 1983 the first nuclear power project was commissioned in Zhejiang province, and in 1985 a joint-venture agreement was made for Daya Bay in Guangdong province. Despite China’s ability to construct and utilize nuclear power plants, the government has always viewed such fuel as supplementary. By the end of 1999, nuclear power accounted for only 1.24% of total electricity generation and 1% of total installed generation

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However, in order to meet growing energy demand and decrease the country’s emissions, the government has planned to increase the share of nuclear power in the country’s total power-generation capacity to 5% by 2020.\textsuperscript{112}

**Hydro-Electricity**

With an estimated 378 GW of exploitable hydro capacity, China ranks first in the world in hydro-electric potential. As previously noted, the development of China’s hydro-electric capacity substantially increased during the Great Leap Forward, during which time both large and small hydro-electric stations were constructed. In 2000, hydro-electricity constituted 24% of China’s total installed generation capacity,\textsuperscript{113} and in 2006 China produced 435,786 GWh of hydro-electricity.\textsuperscript{114} One of the most well known, as well as most controversial, hydro-electric projects in China recently is the Three Gorges Dam, constructed on the Yangtze River. While major construction of the dam has been completed, additional generating capacity continues to be added. On October 30, 2008 the Dam contained 26 generators of 700 MW each, for a total generating capacity of 18.2 GW. Currently six additional

\begin{thebibliography}{99}
\bibitem{111} ibid 65
\bibitem{112} (2008). China ups targeted nuclear power share from 4% to 5% for 2020. \textit{Xinhua News}. Beijing, China View.
\bibitem{114} (2008). \textit{APEC Energy Overview}. Tokyo, Japan, Asia Pacific Energy Research Centre: 1-201. P.48
\end{thebibliography}
generators are being installed in an underground power house which, once completed, will bring the Dam’s total generating capacity to 22.4 GW.\textsuperscript{115}

While this project represents an incredible engineering feat, as well as a major source of renewable energy for China, the social and environmental costs have surrounded the project in controversy. Indeed, the forced relocation of more than 1.3 million residents,\textsuperscript{116} the inundation of 632 sq. km of land,\textsuperscript{117} the destructive impact on the local ecology and biodiversity, reports of potentially dangerous seismic activity caused by the dam and its generators,\textsuperscript{118} and the numerous safety issues involved in this project present major obstacles in the construction of other large hydro-electric dams. While China’s authoritarian system makes the development of large-scale hydro-electric projects easier to accomplish, rising environmental protests across the country may hold a greater influence in the decision-making of China’s leaders as such protests begin to threaten the Party’s absolute priority of national stability.

\textbf{Renewables}

Following the enactment of the Renewable Energy Law in 2006, the NDRC has established medium- and long-term targets for the development and utilization of renewable energy technologies in the country’s total energy

production. Although the contribution such sources of energy will make in total energy production is likely to be minimal in the medium-term, due mostly to the rapidly growing demand for energy, in many areas, particularly in remote off-grid locations, wind, solar photovoltaics (PV), and small-hydro stations are already the least-cost option for residents.\textsuperscript{119} Indeed, in chapter 4, the use of renewable energy technology in rural electrification projects is shown to constitute one of the major domestic arguments for supporting the further development of the industry.

\textbf{Table 3.6 China’s 2020 Targets for Alternative Electricity Sources}

<table>
<thead>
<tr>
<th>Targets</th>
<th>2004 Capacity (GW)</th>
<th>2020 Target Capacity (GW)</th>
<th>Implied Average Annual Growth</th>
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<td>60</td>
<td>32%</td>
</tr>
<tr>
<td>Wind</td>
<td>0.82</td>
<td>30</td>
<td>25%</td>
</tr>
<tr>
<td>Hydro</td>
<td>105.24</td>
<td>300</td>
<td>6.8%</td>
</tr>
<tr>
<td>Solar</td>
<td>0.06</td>
<td>1.8</td>
<td>125%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>6.84</td>
<td>40</td>
<td>11.7%</td>
</tr>
<tr>
<td>Biomass</td>
<td>0</td>
<td>30</td>
<td>n/a</td>
</tr>
</tbody>
</table>


Currently, China’s development of wind resources is the most advanced of the renewables, with a total installed capacity of 12GW in 2008.\textsuperscript{120} Wind generating plants are concentrated in Xinjiang and Inner Mongolia Autonomous Regions, Guangdong, and Zhejiang provinces.\textsuperscript{121} It is estimated that China’s total wind potential is as high as 1,000 GW, with 250

GW on land and 750 GW offshore.122 In 2006 China produced 3,868 GWh of wind electricity, and 105 GWh of electricity from solar PV. Tibet has the largest total installed capacity of solar power of 2000 kw, and the largest solar power facility with a capacity of 100kw.123

    Though the development of China’s renewable energy resources remains small compared to its traditional fuel sources, the government’s ambitious plans to increase the share of renewable energy in total energy production as well as its need to address the country’s long-term prospects for environmental degradation due to pollution and emissions originating from the fossil-fuel sectors provide ample incentive for the country’s development and utilization of these technologies. Also, as China has become “the world’s factory” for most manufactured items, it is increasingly becoming a major exporter of renewable energy technologies. The Chinese solar industry consists of several major international players, including Suntech Power Holdings, which have been involved in the development of major solar power facilities in countries around the world. Due to a lack of government subsidies, the majority of these technologies are exported rather than used by the domestic market. However, new government policies, especially the feed-in tariff implemented by the Renewable Energy Law, promise great potential in the future domestic market for renewable energy technologies.

P.34
Conclusion

This chapter has offered an overview of China’s energy sector to provide a context for the recent development of renewable energy. With its abundant coal reserves, powerful entrenched bureaucratic interests, and apparent disregard for the environment relative to its priority of economic growth, China’s rapid development of renewable energy seems counterintuitive to the government’s previous logic regarding the energy sector centering on coal and rapid economic development regardless of environmental impact.

In the following chapters, two possible explanations for this phenomenon are evaluated to better understand the sources of influence underlying the government’s renewable energy policies. First, international pressure in the form of international environmental conferences, treaties, norms, and funds have persuaded China to begin addressing its rapidly deteriorating environment by investing in clean and renewable energy resources. Second, as renewable energy technologies have been increasingly promoted by developed countries in response to the threat of global climate change, the Chinese government has recognized the capacity for renewable energy to provide solutions for longstanding domestic political and economic problems facing the country and has thus begun to develop them in earnest.
Chapter 4: The Effects of International Pressure on China’s Domestic Policy-Making

Party to more than twenty international environmental agreements, China has demonstrated its willingness and capacity to participate in such multilateral regimes and become increasingly more involved in international governance. Given its historical lack of concern for the environmental consequences of its economic growth, China’s cooperation in such areas as environmental protection seems likely to be the result of pressure exerted upon it by the international community. This chapter will analyze the processes, motivations, and pressures occurring within and beyond China’s borders regarding the country’s involvement in international environmental agreements in order to determine the extent to which the Chinese government’s actions have been influenced by international pressure.

Three major international environmental conventions, the UN Conference on the Human Environment (UNCHE), the Vienna Convention for the Protection of the Ozone Layer, and the UN Conference on Environment and Development (UNCED), as well as the resulting protocols and treaties they produced will be examined in order to evaluate the extent to which international pressures have directed Chinese actions. While the UNCHE and Vienna Convention do not directly relate to the development of a renewable energy sector, China’s participation in these agreements provides a useful reference to help illustrate how its involvement in conventions and treaties which promote renewable energy, such as the international Agenda 21 and the Kyoto Protocol, has facilitated the development of this sector in China. Though far from a conclusive list, these conventions represent important examples of China’s growing
involvement in and commitment to solving global environmental problems and provide a basic framework to explain China’s motivation for participating and its general outlook on such environmental regimes.

One factor which appears crucial to explaining China’s involvement in such regimes concerns the extent to which its efforts have been supported by financial and technical assistance provided through multilateral mechanisms, such as the Multilateral Fund and the Clean Development Mechanism, international financial institutions, including the World Bank and Asian Development Bank, and China’s bilateral relationships, with the US and Japan as prime examples. Indeed, it appears that although international pressure has played a significant role in driving China to participate in global environmental issues, this pressure is most effective when channeled through the various funding mechanisms established in these agreements and the resulting projects and policies they facilitate.

Although China’s desire to be seen as a responsible and cooperative player in the international community contributed to its engagement of these issues, the provision of financial and technical assistance from the international community appears to be the most powerful motivation for the development of specific projects selected to ensure compliance. In the context of renewable energy, the availability of such funds constitutes a major force in the development of this sector as will be demonstrated by the impressive number of renewable energy projects and capacity building efforts undertaken in China with the support of the international community.

This chapter will begin with a discussion of the UNCHE and its impact on China’s governmental structure, policies, and priorities. As the first international
environmental conference, the UNCHE had a profound impact on China by placing environmental concerns on the international agenda and promoting environmental norms, thereby requiring China’s government to formulate administrative and policy responses. Then an examination of China’s participation in the Vienna Convention and the resulting Montreal Protocol will demonstrate how China’s leaders have engaged international environmental issues as well as how the provision of international assistance influenced the government’s decisions. Next, China’s approach to the UNCED and its involvement in the resulting Agenda 21 and UN Framework Convention on Climate Change will reveal how the international community has succeeded in bringing China to the table on complicated and contested global environmental issues even as China simultaneously used these regimes to its advantage. Finally, this chapter will conclude by identifying a few examples of renewable energy projects that have been established with international financial and technical assistance to demonstrate the impact these projects, and by extension the international community, have had on the overall development of this sector.

The UN Conference on the Human Environment

In the early 1970’s a growing recognition regarding the increasingly detrimental consequences of industrialization and economic growth on the global environment began to emerge within the international community. To address this issue, the UN convened the UNCHE in Stockholm, Sweden, from June 15-16 1972, making it the first major international conference on environmental issues. Successfully putting environmental issues on the international agenda, this conference
brought together the governments of one-hundred and fourteen countries who “agreed that their environmental fortunes were interconnected, and that they shared a single global commons.”\(^{124}\) The UNCHE produced two concrete measures: The Stockholm Declaration and the establishment of the UN Environment Program (UNEP) as the leading international agency on environmental matters.

Though the Stockholm Declaration and the establishment of the UNEP are important achievements in and of themselves, the major consequence of the UNCHE was to foster a serious debate about environmental problems in every participating country as well as to facilitate the establishment of environment ministries, agencies, and departments in each country’s government. In anticipation of the UNCHE, China established an informal leading group for environmental protection under the State Council in 1971 to supervise the government’s preparations for the upcoming conference. In this way, “China's first high level environmental policy body was established in direct and urgent response to an impending international conference.”\(^{125}\)

The UNCHE successfully “raised the profile of environmental issues on the agenda of China’s leaders and contributed to the establishment of the country’s first formal environmental protection apparatus.”\(^{126}\) Indeed, “since the late 1970s…China has enacted or promulgated over a dozen environmental and related statutes, dozens of regulations and several hundred standards - all of which exercise an increasingly


important role within the economy.” Furthermore, in direct response to the Conference, China’s State Council held its first National Conference on Environmental Protection in 1973, enacted several administrative regulations, made a voluntary contribution to the UNEP of $131,628, and established a permanent mission to the UNEP in March 1976. Thus, the UNCHE had a profound impact on the Chinese government by placing environmental issues on the national agenda, stimulating the establishment of new government agencies, and facilitating the promulgation of new policies and regulations.

China’s administrative and regulatory response to the UNCHE is particularly impressive when the country’s actions at the Conference are considered. For consideration in the conference Draft Declaration, the Chinese delegation articulated ten main principles that reflected the government’s view on such regimes. These included:

1. “the need to distinguish between the environmental responsibility of developed and developing states…”
2. “the right of states to exploit as well as protect their own natural resources…”
3. “the right to compensation for international pollution; the need for international exchanges in scientific and technical knowledge on environment conservation…”
4. “the necessity of establishing an international environment fund…”

Originating when environmental concerns first entered the international agenda, these principles have more or less constituted China’s position for all subsequent international environmental issues. With these principles, China echoes the positions of most developing countries by principally blaming the developed states for the

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129 Ibid. P.150
environmental problems plaguing the planet and vociferously defending the right of developing countries to exploit their natural resources. Thus, while a growing international awareness of environmental pressures obliged China to engage these issues when it likely would not have otherwise, its maintenance of virtually the same underlying beliefs in this area represents a prominent example of the limits of international pressure. Even more controversially, at the UNCHE “the delegation attempted unsuccessfully to inject such tangential and divisive issues as the Vietnam War and nuclear testing into the Conference declaration.”\(^\text{130}\) Indeed, China’s promotion of such items at the conference was likely intended to derail the Declaration altogether, and the country’s public announcement that it had not taken part in the voting provides further evidence of its true sentiments.

Similar to how many critics have described China’s participation in the 2009 UN Climate Change Conference, at the UNCHE “China was a ‘laggard’ participant in this international regime, avoiding international obligations by shunning treaty commitments or exhibiting a disdainful attitude towards compliance obligations.”\(^\text{131}\) Yet, despite its obstructionist actions, China nevertheless responded to this international conference by enacting numerous environmental regulations and creating new agencies to deal with environmental problem. Most significantly, the UNCHE prompted the establishment of a small Environmental Protection Office in 1974, which later evolved into the State Environmental Protection Administration (SEPA) and, in its current form, the Ministry of Environmental Protection. Thus,

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\(^{131}\) ibid
international pressure undoubtedly affected the government’s decision-making and priorities, illustrating the power of socializing forces in the international community.

Clearly, the UNCHE brought environmental issues to the attention of Chinese policy-makers, who otherwise would have likely continued to ignore such issues seen as peripheral to the dominant priority of economic development. The Conference directly influenced the creation of environmental agencies and policies and facilitated China’s subsequent involvement in future international environmental regimes. After the Conference, China continued its progress on addressing environmental concerns as this process of environmental awareness and capacity-building “had by then gained momentum and China’s leaders started to realize that this was a real problem—putting all the blame on the Western capitalist system did not help much to alleviate their own very real environmental problems.”132 In this way, international pressure and the socializing forces embodied in the UNCHE directly affected China’s awareness and treatment of environmental issues as evidenced by the appearance of official rhetoric on the importance of the environment, the establishment of domestic environmental agencies, the promulgation of environmental laws and policies, and China’s participation in future international environmental regimes. The UNCHE, therefore, laid the foundation for China’s attitude towards environmental issues and represents a clear and distinct example of the influence exerted by the international community on China’s domestic and foreign policy-making.

The Vienna Convention for the Protection of the Ozone Layer

Following the conclusion of the UNCHE China continued to participate in and accede to numerous international environmental agreements, including the 1981 Convention on the International Trade in Endangered Species, the 1985 London Convention against Ocean Dumping, the 1985 World Heritage Convention, and the 1986 International Tropical Timber Agreement. Though each convention clearly impacted China’s environmental policy-making, the 1985 Vienna Convention and the resulting Montreal Protocol of 1992 provide important examples of how international pressure has affected China’s decision-making and serves as a useful comparison to the UN Framework Convention on Climate Change, to be discussed later.

After the publishing of numerous scientific reports documenting the negative effects various chemicals had on the planet’s ozone layer in the late 1970’s and early 1980’s, several countries began to seek remedies to this growing environmental catastrophe. At the time, these ozone depleting substances (ODS) were primarily produced by developed countries, though developing states were beginning to produce and consume them in ever larger amounts. The UNEP, after concluding its World Plan of Action on the Ozone Layer in 1977, drafted a global Framework Convention on Stratospheric Ozone Protection in 1981. This evolved into the Vienna Convention for the Protection of the Ozone Layer, which was adopted on March 22, 1985 and was opened for signature on September 22, 1985. The Convention, which received the signature of twenty-six countries and the European Economic Community, proceeded to work on a protocol to provide specific targets for certain chemicals, resulting in the Montreal Protocol which entered force in January of 1989.
Although China did not sign the Vienna Convention, after the conclusion of the Montreal Protocol international pressure began to build on China to participate. Indeed, China’s involvement was vital to the effectiveness of the regime, for though China’s contribution to ODS emissions was minimal before the 1980’s, its rapid economic growth following the period of reforms in the late 1970’s led it to consume 3% of the world’s total ODS by 1986. In fact, by 2001 China “had become the chief contributor to ozone depletion and remained so in 2003.”\(^\text{133}\) Recognizing the leverage they enjoyed due to their growing contribution to the problem, the Chinese government saw an opportunity to lead the negotiating efforts of its developing country allies and ensure its interests would be represented in the bargaining.

Initially, the Chinese government saw three reasons to sign on to the Convention: First, the treaty’s potential sanctioning mechanism against countries which traded in products using ODS would harm China’s imports and exports; “Second, some within the Chinese leadership believed that, as a member of the international community, China should contribute to the resolution of ozone depletion and that it would enhance China’s image to sign. Finally…strong scientific evidence and interactions with the international scientific community were also key reasons for supporting accession.”\(^\text{134}\) However, officials felt that the costs to meet the Protocol’s requirements would be too great for China’s economy. As an observer at the first Meeting of Parties to the Montreal Protocol in 1989, the Chinese delegation “insisted that there should be a difference between the efforts required of developed and developing states and that, in implementing their obligations, developing states

\(^{134}\) Ibid 182
should obtain investment and technological assistance from developed states.”135 This concept of “common but differentiated” responsibilities and the demand for international assistance in complying with its obligations would come to define China’s negotiating strategy for future environmental treaties, especially those regarding climate change.

Following a proposal by China’s National Environmental Protection Agency (NEPA, the precursor to the SEPA), the government decided to subscribe to the Vienna Convention in order to modify the provisions of the Montreal Protocol to make it more amenable to China’s economic priorities. Therefore, on September 11, 1989 China acceded to the Vienna Convention and prepared its negotiating strategy to amend the Montreal Protocol. China found four faults with the original Protocol: the unsatisfactory “way it allocated responsibility for the destruction of the ozone layer; its lack of a financial mechanism for protection of the ozone layer; its weakness on technology transfer; and its failure to guarantee developing countries equal access to such benefits.”136 Significantly, China’s problems with the Protocol reflect the country’s original principles articulated for the Draft Declaration at the UNCHE, demonstrating that while China had accepted the need to address environmental issues due to international pressure its outlook on such measures and its conditions for participation had remained unchanged.

Indicative of the need for China’s involvement and its leadership role for the developing countries, at the second Meeting of Parties to the Protocol in 1990 the London Amendments were introduced and agreed upon. This amendment is

136 Ibid 157
significant for its establishment of the Multilateral Fund (MLF), an international mechanism to provide financial and technical assistance to developing countries in their efforts to meet their treaty obligations. The creation of the MLF was a significant victory for China and the developing states and, with funds and assistance readily available, on June 14, 1991 China acceded to the Montreal Protocol and London Amendments. Thus, the establishment of a multilateral facility from which China could extract financial and technical aid was crucial to its decision to join the treaty. Indeed, China’s experience with the Montreal Protocol “suggests that financial and technical assistance is an effective, and likely essential, mechanism for engaging the participation of China and other developing countries in international environmental treaties.”

Without the provision of considerable aid from the international community, China’s participation in environmental regimes would likely be highly circumscribed, if not withdrawn completely, due to its economic imperative and the unacceptable costs to its development compliance with such agreements requires.

This economic calculus is prevalent in almost every environmental agreement China has joined, including the four mentioned earlier in this section. For each treaty, “while many individual Chinese understand and endorse the environmental purposes of the agreements, they were able to convince the skeptics by pointing to the agreements’ short-term benefits and possible international penalties.”

The need for material incentives to induce Chinese participation and compliance suggests that a

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desire to be seen as a cooperative international player, and therefore the strength of international pressure and socializing forces, remains subordinate to the government’s political imperative of delivering unfettered economic development to its constituents. Though the integrating and socializing effects of international pressure is evidenced by China’s ratification of various conventions, its refusal to “ratify their associated protocols until [China] had ensured through negotiations that the results would conform with its interests,”\textsuperscript{139} demonstrates that the pressure to develop its economy is far stronger. Without the funds provided by the MLF, the Chinese government would not have embarked on the necessary measures to limit the damage to the ozone caused by its production and consumption of ODS, which China saw as an important input for various parts of its manufacturing sector.

Shortly after the establishment of the MLF, China utilized the newly available funds by applying for numerous projects in areas covered by the treaty. After submitting its Country Program to the UN Development Program (UNDP) on January 15, 1993, China issued a report to the MLF in which “it set out 140 projects requiring an estimated $US 1.4 billion to implement.”\textsuperscript{140} Despite China’s apparent enthusiasm for environmental projects financed in whole or in part by the international community, problems arose between the government and the MLF. For example, of the $1.4 billion requested, by 1998 China had “received only $30 million from external funding sources. As one scientist complained, China consumes 70 percent of ODS among developing countries but receives only 20 percent of the funds

\textsuperscript{140} Ibid 163
This serious lack of funding is directly responsible for China’s initial failure to comply with its treaty obligations. In 1996, the date for which China’s country program specified a significant reduction of its production and consumption of ODS, China missed this target by a long shot with ODS production and consumption levels exceeding their targets by 94% and 65%, respectively.\textsuperscript{142} However, following a reform of the MLF’s distribution scheme, which facilitated a significant increase in the funding available to China, the country’s ODS reduction accelerated appreciably. Indeed, “the most critical determinant of China’s progress in reducing ODS is the shift of the MLF funding mechanism from a project-by-project approach to a sector approach beginning in 1997.”\textsuperscript{143} Therefore, the availability of international funds proved essential to China’s ability to meet its environmental targets. Specifically, the manner in which international assistance is provided for China’s projects is crucial to determining the country’s success in meeting its commitments. In this way, pressure from the international community on China has been most effective when coupled with ample financial and technical assistance to help China implement the necessary administrative changes and environmental projects.

The Vienna Convention, Montreal Protocol, and the MLF have all directly influenced the Chinese government’s priorities and policies relating to environmental protection. The Vienna Convention and Montreal Protocol brought significant

\textsuperscript{143} Ibid 67
international pressure to bear on China as it increasingly contributed to the problem of ozone depletion and thereby encouraged the government to reevaluate its economic and environmental policies in accordance with growing international norms. Importantly, the key drivers behind China’s eventual acceptance of and accession to the Montreal Protocol were economic, not environmental, objectives: the fear of sanctions against non-participating countries as well as the provision of financial and technical aid for participating developing countries. Due to this, the argument that China’s environmental policy-making has resulted from concerted diplomatic pressure by the international community alone cannot be sustained. Instead, the material incentives and disincentives provided by environmental conventions and treaties have proven to be the decisive factor in determining China’s participation. Although such incentives represent a distinct form of international influence, China’s relative control over the utilization of such aid has ensured that these projects contribute to the country’s economic development, thereby satisfying the government’s national objectives. It appears, therefore, that while international conventions have successively induced administrative and policy changes within China, the imperative of economic development has constrained the extent to which China has been willing to bend to international influence. This argument will be further substantiated in the following section regarding China’s participation in the continuing climate change negotiations.

The UN Conference on Environment and Development

In 1992, twenty years after the first international environmental conference, the UN organized the UNCED in Rio de Janeiro, Brazil in order to address the
important environmental issues of the day, with a specific focus on how to integrate environmental objectives with economic goals. In preparation for the conference, and to strengthen its position as a leader of the developing world, in 1991 China, with the support of the UNEP, convened a Ministerial Conference of Developing Countries on Environment and Development. This conference served to reiterate the rhetoric employed by China’s leaders regarding environmental protection since the UNCHE. Among other statements, the conference recommended that “while environmental questions were the common concern of all mankind, they should be considered within the context of economic development; and that developed states should understand and support the needs and special circumstances of developing states, and cooperate with them in effecting capital and technical transfers.”  

Though significant, this conference represented just one of many for China. Indeed, highlighting its newfound environmental awareness, “from 1991 to 1992 Beijing hosted as many as 10 international environment-related conferences to underline its attention to global environmental problems including climate change.” While such acts may appear as mere grandstanding, these efforts signify the evident salience that international environmental norms have increasingly had on China’s decision-makers. Although international pressure regarding environmental issues have always resonated more deeply in some governmental ministries than others, in preparation for the UNCED “Chinese environmental and scientific officials held a series of meetings to educate and pressure their planning and industry colleagues about the importance of

incorporating environmental objectives into China’s plans for economic development.”¹⁴⁶ These actions alone serve to demonstrate the extent to which international forces prompted China to become more active in environmental protection.

Among the important outcomes of the UNCED, the international Agenda 21 and the UN Framework Convention on Climate Change (UNFCCC) are arguably the most significant. Endorsed by the governments, development agencies, and non-governmental organizations (NGOs) at the conference, the Agenda 21 presents a comprehensive program to promote the resolution of global environmental problems and encourages countries to adopt the concept of sustainable development as part of their development strategies. Defined as economic development in harmony with the environment,¹⁴⁷ the concept of sustainable development is meant to guide states, especially developing countries, on how to develop their economy without sacrificing their natural environment. The UNCED and the concept of sustainable development appear to have marked a turning point for China, as this “view of the environment and development as two sides of the same coin made it easier for China—as well as the rest of the G-77—to take a more constructive position at the Conference.”¹⁴⁸

Reminiscent of its participation in the UNCHE, China’s Premier Li Peng articulated the five principles which informed China’s environmental policies at the Conference. While this statement certainly represents an improvement from those delivered at the UNCHE, these principles continued to reflect China’s statist and

developmentalist orientation. These principles included “that environmental cooperation should be based on respect for state sovereignty; that protection of the environment and development were closely connected with world peace and stability; and that the management of environmental problems must take into account each country’s realities and practical interests, as well as long-term global interests.”

After twenty years experience and having signed on to numerous international environmental agreements, the Chinese government has maintained virtually verbatim its initial position regarding environmental issues, placing them below the priority of economic development unless such actions to alleviate environmental problems coincide with its development plans and are supported financially by the international community.

Nevertheless, the Chinese government has clearly internalized the norms promoted at the UNCED, as evidenced by its integration of Agenda 21 into its Ninth Five-Year Plan (1996-2000) and its adoption of sustainable development as its national policy. Indeed, the UNCED’s promotion of the term sustainable development was so successful that “the term now provides an accepted framework within which Chinese officials press for the incorporation of environmentally sound practices into future economic development.”

Furthermore, in an added show of its newfound environmental zeal, within one year of the Conference China became the first country to release its own Agenda 21. According to Barbara Finamore, a senior attorney for the Natural Resources Defense Council, “China responded so quickly

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because their own Agenda 21 gave them a lot of recognition internationally as a responsible actor and a forward-thinking country.”

Not only does China’s Agenda 21 illustrate the extent to which the international community affected the country’s policy-making and prioritizing, but the UNDP was instrumental in the actual formulation of the Agenda 21 program. The UNDP “proposed the idea, provided financial support, offered international expertise, reviewed the proposed priority projects, and arranged the international donor meetings.” Once again, China’s attitude towards environmental issues and its development of policies aiming to reduce the negative impacts of its economic growth came as a direct result of international pressure, in this case in the form of the UNCED and with the aid of organizations like the UNDP.

To facilitate the implementation of its Agenda 21, China created several important new administrative agencies and institutions. To oversee the operation of China’s Agenda 21 programs and policies, the government created the Administrative Center for China’s Agenda 21, led in concert by the State Planning Commission, the State Science and Technology Commission, the Ministry of Foreign Affairs, the State Economic and Trade Commission, the Ministry of Foreign Trade and Economic Cooperation, and the National Environmental Protection Agency, with members from every other ministry, bureau, and agency. Furthermore, the China Council for International Cooperation on Environment and Development (CCICED) was established, with its first formal meeting held in 1992, to facilitate the exchange of ideas from international actors and provide recommendations to policy-makers.

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Indicative of the stature held by the institution, from 1992 to 2003 the CCICED was chaired by Wen Jiabao until he became Premier of the country. The CCICED represents a significant example of China’s increasingly serious attitude towards environmental issues, and “many Chinese environmental actors consider [the CCICED] one of the most prestigious and effective forums for international environmental cooperation.” Among its recommendations, the CCICED has advised the government to “reinforce effective financial measures and induce market-oriented incentives for attracting foreign capital and technology into policies,” as well as trying “to support China in collaborating with the international community in environmental and developmental areas.” Although the majority of the CCICED’s recommendations reflect the conventional proposals promoted by the Inter-governmental Panel on Climate Change, the Council has remained an effective advocate of environmental policy since its establishment.

Thus far, evidence shows that China has taken its Agenda 21 commitments seriously. For example, Chapter 2 of Agenda 21 states that countries should seek to ensure that commodity prices reflect their true environmental, social, and resource costs. While China maintains several elements of a command economy, the government has responded to this advice by removing most of its controls on the price of coal in 1994. In this way China’s participation in the UNCED provided a major impetus for the government to develop its own Agenda 21, along with the necessary bureaucratic and policy structure to support its implementation. This

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153 Ibid 187
international conference also created a renewed awareness amongst Chinese policy-makers and the general public about the importance of the environment and the benefits of sustainable development.

The international community has been integral in not only pressuring the Chinese government to take environmental issues seriously, but also has provided enormous amounts of financial and technical assistance to ensure that China can follow through on its promises and proposals. For example, since 1992 “China has been the largest borrower from the World Bank, and in the past several years lending for environmental protection has become the fastest growth area of the World Bank’s programs in China.”\(^{156}\) China is also the largest borrower from the Asian Development Bank (ADB), which has “set aside more than $4 billion for environment-related projects in China.”\(^{157}\) Along with these international financial institutions, China has received significant support in the form of aid and advice through its bilateral relationships, namely with Japan and the USA. For Japan, the improvement of China’s environment is in its own best interests as pollution, harmful emissions, and even dust from China’s growing deserts find their way to Japan’s shores. Due to this, Japan has made environmental assistance to China the number one priority of its overseas development aid budget, with its assistance in 1999 alone totaling $1 billion, of which over two-thirds of its projects were devoted to environmental protection.\(^{158}\) The USA has also provided substantial policy advice and technical assistance through agencies such as the US Environmental Protection Agency (EPA), the Department of Energy, the Department of Commerce, and the

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\(^{156}\) Ibid 629  
\(^{158}\) Ibid 190
US-China Chamber of Commerce. For example, in meeting its obligations under the Montreal Protocol, the EPA and the American company Du Pont actively helped the Chinese develop substitutes for chlorofluorocarbons.\textsuperscript{159} Furthermore, international organizations such as the UNEP have been instrumental in helping the Chinese government meet the demands imposed by China’s membership to various environmental treaties. The UNEP has “trained [China’s] environmental specialists, facilitated and financed the transfer of new technologies, and educated the Chinese public to become more environmentally sensitive.”\textsuperscript{160} This financial, technical, and policy assistance has significantly supported China’s efforts to achieve its goals of sustainable development by not only providing financing for specific projects but also by adding legitimacy to Chinese officials and agencies who promote more environmentally-friendly policies. In this way, the international community, through the convening of international environmental conferences and the provision of financial and technical aid, has certainly impacted China’s views on and actions towards the environment.

**The United Nations Framework Convention on Climate Change**

Another important outcome from the UNCED was the establishment of the UNFCCC and its promotion of the global environmental crisis of global warming onto the international agenda. Climate change emerged as a major international issue in the late 1980’s following assertions by scientists that the emission of particular


chemicals, especially those released by the combustion of fossil fuels, was creating a greenhouse effect and slowly heating up the planet. As this issue began to dominate the international political agenda, China responded by developing its own climate policy and established the National Climate Change Coordinating Group to prepare for upcoming international negotiations on the issue.

In 1990, the Environmental Protection Commission of the State Council issued a declaration outlining China’s positions on this new global environmental issue which, unsurprisingly, continued to stress its demands for common but differentiated responsibilities. Indeed, “the declaration highlights the principles of global responsibility of developed countries for global environmental deterioration, the harmony of both environmental protection and economic development, the recognition of developing countries’ right to develop, the sovereign equality of all states, and the need for new and additional funds for developing countries.”

During the initial round of negotiations in 1991, China vigorously opposed establishing targets and timetables for emissions reduction, opting for a framework convention devoid of specific obligations. China, in concert with the other developing nations, “emphasized the historical responsibility of developed countries for climate change, and agreed to participate in the climate negotiations only on the condition that they should not be required to take any substantial commitments of their own.” In this way, China made clear the limits of its participation on this

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issue, reflecting both its uncertainty over the science behind climate change and its aversion to the necessary and costly measures required to mitigate this phenomenon.

The resulting UNFCCC, adopted in 1992 at the UNCED, required no abatement measures from any of the parties but established a general goal of stabilizing emissions. Contrary to expectations, China not only signed the UNFCCC in 1992 but was among the first countries to ratify it in 1993. Despite its initial participation, China has since “retarded the negotiation timetables in order to avoid being compulsorily targeted for emission reduction.”\textsuperscript{163} China has also continued its insistence that developing countries remain free from reduction obligations and that developed nations provide them new and additional financial and technical assistance to aid in their voluntary efforts. Nevertheless, at the third Conference of Parties to the UNFCCC, China signed on to the Kyoto Protocol on May 29, 1998, though it waited until 2002 to ratify the agreement. By joining the UNFCCC China “accepted its limited obligations under the Convention but, at least until 2002, not under the more specific Protocol.”\textsuperscript{164} China’s motivation for signing the UNFCCC and the Kyoto Protocol likely reflected the government’s desire to be seen as a responsible and cooperative power, but its decision to ratify the Kyoto Protocol stems from its desire for international assistance.

Similar to the Montreal Protocol, the major force behind China’s decision to ratify the Kyoto Protocol appears to have been the funds and technical aid made available to developing countries through the flexible mechanisms established in


successive rounds of negotiation such as the Clean Development Mechanism (CDM) and Joint Implementation. As an incentive for developing countries to participate, the CDM allows emission-reduction projects in developing countries to earn certified
emission reduction credits, which can then be traded or sold to industrialized
countries as a way of meeting their treaty obligations. Though initially skeptical of
such mechanisms, due to developing countries’ fear that they would reduce official
development assistance (ODA) funding, China has embraced CDM as a way of
contributing to the climate change mitigation efforts and “is becoming China’s
preferred methodology for participation under the Kyoto Protocol (instead of
mandates).”¹⁶⁵

Since its ratification of the Kyoto Protocol, China has issued numerous policy
plans highlighting its commitment to improve energy efficiency and develop
renewable energy. Similarly, China has applied for numerous projects through the
CDM and other international actors and mechanisms, such as the World Bank’s
Global Environmental Facility (GEF), ADB, and its bilateral partners to follow
through on these policy goals. In 2004, China’s State Council approved the China
Medium and Long-Term Energy Development Program (2004-2020) and the China
Medium and Long-Term Energy Conservation Plan which both highlight the
government’s support for energy conservation.

In 1996, China’s first Renewable Energy Law came into effect, providing
subsidies and tax incentives for the development of renewable energy resources. This
law is modeled partly on European “feed-in laws” and requires electricity producers

to purchase all of the electricity generated by approved renewable energy facilities located in their service areas. Furthermore, in 1994 the State Council approved the New and Renewable Energy Development Program (1996-2010), which seeks to improve the efficiency of renewable energy technology, lower production costs, and enlarge the contribution of renewable energy in the energy system. Though international pressure cannot claim full responsibility for the Chinese government’s enactment of these policies, such measures have clearly been implemented in order to make China more qualified for projects under CDM and GEF as well as more attractive to international investors. In this context, it appears that the development of a renewable energy industry in China has been significantly influenced and supported by the international community.

**Examples of Internationally Supported Renewable Energy Projects**

While hundreds of projects supported by international financing mechanisms and actors exist in China, this section will look briefly at a few major ones, specifically those related to renewable energy.

Through the World Bank’s GEF, China has engaged in numerous renewable energy projects. One such project is the Renewable Energy Development Program, which was launched in December 2001. This program, which aims to reduce CO2 emissions and improve the standard of living for people with no access to electricity, consists of three components. The first concerns the development of photovoltaic (PV) technology, with direct grants offered to PV companies for the purpose of

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assisting them with marketing, sales, and maintenance of a total of 10 megawatts (MW) in 300,000 to 400,000 PV systems. The second component involves the installation of wind turbines with a combined capacity of 20 MW in villages near Shanghai in order to promote the technology in locations with high public visibility. Finally, the third component provides financial assistance to companies producing small-scale wind or PV equipment for developing innovations to improve the cost effectiveness and performance of their products. In 2008, this project was awarded the Ashden Award for Sustainable Energy, the world’s leading green energy prize, reflecting the importance of China’s efforts to expand the use of renewable energy. Such recognition provides a helpful incentive to Chinese policy-makers to continue their efforts in this area and serves to increase local awareness about renewable energy.

Another GEF-sponsored project is the Renewable Energy Scale-Up Program. This program aims to remove barriers to the introduction of renewable energy systems, reduce the cost and improve the performance of small hydro-electric, wind, and selected biomass technologies, and to increase the market penetration of renewable energy so as to make a sizeable cut in greenhouse gas emissions. With $41.6 million provided by the GEF, as well as outside loans and grants totaling $129 million, this 10-year program aids the Chinese government in developing large-scale commercial markets for renewable energy. Along with these two projects, the World Bank has sponsored numerous others, including the Beijing Second

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Environment Project, the largest project in which the GEF has ever been involved in terms of total financing, and the China Energy Conservation Project. With these programs, the World Bank has played a crucial role in supporting the Chinese government’s efforts to make renewable energy a viable solution to the country’s energy needs.

The USA has also been active in helping China develop cleaner energy technologies through projects such as the Technology Cooperation Agreements Pilot Plan (TCAPP) and the U.S.-China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization. Initiated in China in 1997 TCAPP is led by the National Renewable Energy Laboratory on the American side and the State Development Planning Commission (now the National Reform and Development Commission), and provides technical cooperation and business assistance in the area of wind turbine technology. The Protocol, signed February 1995 by the US Department of Energy and the State Science and Technology Commission focuses on helping China diversify its energy resources, mitigate environmental damage through the deployment of renewable energy and energy efficiency measures, and to enhance US industry competitiveness in China’s energy market. Furthermore, the US’s efforts at promoting renewable energy in China received a substantial boost under the new American administration which quickly established several important partnerships with China. These include the U.S.-China Clean Energy Research Center, the U.S.-China Energy Efficiency

Action Plan, the U.S.-China Renewable Energy Partnership, and the U.S.-China Energy Cooperation Program.\textsuperscript{172} Despite the US’s obstructionist stance towards international climate change agreements, which have negatively influenced the Chinese government in their approach to such regimes,\textsuperscript{173} cooperation with the US on renewable energy has certainly added legitimacy, financial, and technical support for the development of this sector.

The Asian Development Bank (ADB) has also played an increasing role in China’s efforts to produce renewable energy. One recent example of this is its support for construction of a wind farm in the Inner Mongolia Autonomous Region. Of the $73 million the project is expected to cost, the ADB is providing $24 million to a joint-venture between Chinese and Japanese energy companies. This project represents the first private-sector wind farm to be financed by the ADB in China, and will serve to entice more investors to participate in the development of this sector.\textsuperscript{174}

The aforementioned projects represent just a small sampling of the numerous endeavors undertaken by the Chinese government in concert with international institutions and foreign countries to support the growth and development of renewable energy in China. These projects embody the most concrete examples of how the international community has directly affected China’s priorities and policies with regards to the environment and renewable energy. Without this financial support, as previously described, China likely would have refused to participate in the various international environmental conventions and agreements and done little to

alter its overreliance on the dirtiest fuel source, coal, the use of which has propelled China to become the world’s largest emitter of greenhouse gases. As China continues to apply for such projects, and as long as international assistance remains available, these efforts will continue to support the development of a renewable energy industry in China.

**Conclusion**

This chapter has demonstrated that China’s participation in international environmental conventions and treaties has undoubtedly influenced the government’s policies and priorities regarding environmental issues generally, and renewable energy specifically. The UNCHE represented China’s first foray into the international environmental arena and laid the foundation for the country’s attitudes towards future environmental regimes. In outlining its ten Principles for the Draft Declaration, China emphasized the importance of state sovereignty and the responsibility of developed countries for the global environmental problems which have arisen since their development. These principles continued to inform the country’s position towards the numerous environmental treaties that followed and remain the underlying basis for China’s participation to this day. However, despite its apparent disdain for the goals of the conference, the UNCHE placed environmental issues on the government’s agenda and stimulated the establishment of new government agencies, policies, and regulations to keep pace with the growth of environmental norms in the international community. The UNCHE, therefore, illustrates how international pressures and socializing forces compelled China to enter
the debate on environmental issues and address these concerns with concrete policy actions.

In negotiating its participation in the Ozone regime, China’s problems with the Montreal Protocol reflected the ten Principles from the UNCHE and prevented China from wholly endorsing the treaty. Indeed, it was not until the London Amendments established the Multilateral Fund from which China could extract funds in order to meet its obligations that the government could accept the economic constraints required under the treaty. China’s refusal to participate until the creation of the MLF shows that the socializing forces of participating in international conventions and the country’s desire to be seen as a cooperative player remain subordinate to its economic imperative. However, the success of the Ozone regime reveals that international pressure, though successful in bringing China to the debate, is most effective when coupled with ample financial and technical assistance to lessen the economic costs of compliance. Indeed, economic imperatives still constrain the extent to which China will bend to international pressure, especially on environmental matters.

China’s preparation for and participation at the UNCED displays how the Chinese government has truly internalized environmental norms. By holding over ten environmental conferences, creating its own Agenda 21, and incorporating sustainable development into the national rhetoric and development policies, China has been noticeably affected by concerted international pressure and appears to have embraced environmental norms. To use Kingdon’s terms, international pressure has demonstrably influenced the politics stream of Chinese domestic policy-making by
improving government officials’ receptivity towards “sustainable” policies like renewable energy promotion. Aid from the World Bank, ADB, the UN, and China’s bilateral partners has been instrumental in supporting China’s commitment to environmental policies and projects, especially through mechanisms like the CDM established by the Kyoto Protocol. This assistance has allowed China to follow through on its environmental proposals and, as evidenced by the specific examples of projects, develop a viable renewable energy industry. In this way, international pressure, in the form of environmental conventions which have promoted environmental norms and financial and technical assistance which have supported its environmental policies, has made a marked impact on China’s domestic policy-making and bears significant responsibility for the growth of China’s renewable energy industry.
Chapter 5: Domestic Problems, Renewable Energy Solutions

In the previous chapter, international actors were shown to have had a significant impact on the development of China’s environmental and renewable energy policies. Through the convening of international conferences, the establishment of international environmental treaties and norms, and the provision of financial and technical assistance from multilateral institutions and bilateral partners, the international community undoubtedly exerted influence on China’s domestic policy-making. Importantly, though, this pressure proved most successful when coupled with concrete assistance, especially in the form of international funds to aid China’s implementation of its treaty obligations. These funds served to alleviate China’s initial resistance toward such environmental measures by providing direct incentives which converged with the government’s economic priorities. Indeed, China’s involvement in these international regimes often hinged upon the availability of such funds, indicative of the government’s overriding goal of promoting economic growth above all other concerns.

China’s rapid development of renewable energy indicates that, independent of international pressure and the provision of foreign funds, considerable domestic economic and political pressures exist in favor of promoting this industry. Significantly, the benefits of renewable energy coalesce with several of China’s longstanding economic and political goals. Specifically, renewable energy development provides direct solutions to China’s national security, developmental, and employment goals: domestically produced energy can alleviate the country’s growing dependence on energy imports and increase its energy security; it can help
provide electricity to rural and remote areas where expanding the grid proves too costly; and may create millions of employment opportunities in research and development, installation, management, operations, distribution, transmission, and maintenance of renewable energy projects.

The existence of these domestic pressures combined with sustained international influence has proven vital to China’s promotion of renewable energy as these two stimuli have converged to encourage a positive policy response. Indeed, these converging pressures have created, in Kingdon’s words, a policy window that facilitated the adoption of renewable energy policies as solutions to the country’s domestic problems in a political atmosphere made favorable towards such policies due to concerted international pressure. While numerous obstacles remain in the development of China’s renewable energy sector, the direct political and economic benefits it brings provide powerful incentives for the government to pursue favorable policies towards the industry.

This chapter will begin with a brief description of the various domestic actors, agencies, and ministries involved in China’s energy policy-making in order to illustrate the complexities of the bureaucratic structure and the difficulties in creating national energy policies due to the great number of actors and the complicated distribution of authority. With so many ministries and agencies involved, the government’s active promotion of renewable energy is only possible when powerful actors see significant political and economic benefits to supporting this industry. Then, this chapter will evaluate three of the major benefits provided by renewable
energy which have likely influenced the government’s favorable policies and programs: energy security, rural electrification, and employment generation.

China’s Energy Policy-Making Actors

With so many different actors of various levels of authority involved, China’s energy policy-making system is highly complicated. The fragmented nature of this policy-making structure “has impeded energy governance because there is no single institution, such as a Ministry of Energy, with the authority to coordinate the interests of the various stakeholders.”

Indeed, the number of individual ministries involved in this process is staggering. These include, but are not limited to: the Ministry of Land and Resources, the State Electricity Regulatory Commission, the Ministry of Commerce, the Ministry of Water Resources, the Ministry of Science and Technology, the Ministry of Foreign Affairs, the Ministry of Railways, the Ministry of Construction, the State Commission of Science, Technology, and Industry for National Defense, the Ministry of Environmental Protection, the State Forestry Administration, and the State Asset Supervision and Administration Commission. Of the ministries involved, arguably the most powerful administrative organ in developing China’s energy policies, including renewable energy resources, is the National Development and Reform Commission (NDRC). The NDRC is in charge of economic development policy, holds responsibility for developing and implementing the Five-Year Plans, incorporates sustainable development policies into overall policy-making in China, and develops energy and climate policies related to issues of

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economic development.\textsuperscript{176} As the ministry’s overriding responsibility is to promote and oversee economic growth, the NDRC, with the power to approve, evaluate, and adjust the implementation of renewable energy projects, would have no interest in promoting renewable energy if such projects contributed little or negatively to economic development.

As Chinese policy-making is characterized by consensus-building,\textsuperscript{177} however, each actor involved has the opportunity to affect the outcome of a particular policy to suit its own bureaucratic interests. Policy outcomes result from an arduous process of bureaucratic infighting as “policy change is commonly driven by actors seeking to maximize their own political or economic interests.”\textsuperscript{178} To further complicate this process, central government agencies often have little direct authority over their counterparts at the lower levels of government due to the decentralized nature of China’s government structure. This structure is composed of vertical lines of authority from central government ministries to their local counterparts, and horizontal lines of authority from each territorial-level of government and the local ministerial bureaus.

This complicated distribution of authority inhibits the implementation of policies originating from the central government, as “central government agencies often have only modest authority over provincial governments and agencies, even

those that are formally part of their vertical chains of command." As a consequence of the reforms in the late 1970’s which gradually decentralized power throughout the various levels of government, local governments receive little budgetary allocation from the central government. Instead, local governments must generate much of their annual budgets on their own. This situation “has provided enormous incentives for key officials in each locality to become entrepreneurial – to find opportunities to maximize economic growth in the territory under their jurisdiction.” These incentives often prevent agencies at local levels from fulfilling the directives created by their central government counterparts if local leaders believe such policies could be detrimental to their territory’s economic growth. For example, although the Ministry of Environmental Protection (MOEP) has issued numerous laudable policies designed to improve the country’s environment, the local environmental protection bureaus are often highly constrained in trying to implement these policies by the local governments they serve. As the local government provides these bureaus with their annual budgets, approves advancements in rank, and determines personnel size, the environmental protection bureaus “must take [the local] governments’ concerns into account when regulating industry. It is the local government, therefore, that is the more powerful of the environmental agencies’ two administrative leaders.”

This fragmented system of authority holds true for renewable energy policy-making, as well. The State Commission of Economy and Trade, the Department of Agriculture, the Department of Water Conservation, and the Department of Forestry all have special sectors in charge of renewable energy. As the policies originating from each of these departments are often uncoordinated between them, efforts at any sort of macro-control or long-term planning are substantially undermined. “Due to the difference in goals [of each department], it’s rather difficult to get consistence in the energy policy in the same field.” Furthermore, renewable energy policy-making is made more complicated by the involvement of the state-owned energy companies. Large companies such as the China National Petroleum Corporation, the China Petroleum and Chemical Corporation, China National Offshore Oil Group, the China Shenhua Energy Company Limited, and the State Grid all have ministry level powers.

The authority wielded by these companies often proves detrimental to the development of renewable energy policy-making for three reasons. First, the interests of ministries such as the MOEP and NDRC often diverge from those of the state-owned energy companies, who refuse to invest in renewable energy if it remains not cost-effective. Second, these companies can use their monopoly power status to constrain efforts of government regulators in managing renewable energy development. Finally, each company works for the interests of their particular industry, resulting in struggles over policy-making and resource allocation between

the industries. Though steps have been taken to alleviate these bureaucratic obstacles, such as the creation of the National Energy Administration and the National Energy Committee in 2008 to coordinate the policies of all the relevant ministries, entrenched interests throughout the bureaucracy have prevented any real restructuring and simplification of the policy-making process. Indeed, despite widespread recognition among Chinese officials and energy experts of the need to establish an overarching Ministry of Energy (MOE), powerful bureaucratic actors such as the state-owned energy companies and the NDRC have consistently opposed this action. “The mere specter of a MOE strikes fear in the heart of the NDRC because it would deprive the NDRC of a substantial portion of its portfolio and important tools of macroeconomic control.”

Thus, the highly complex nature of China’s bureaucracy leaves energy policy-making subject to the various concerns of the numerous agencies involved. Due to the government’s overwhelming priority of economic growth, those actors who support policies dedicated to achieving this goal are vested with greater authority and thus have more sway over the policy-making process. Indeed, the “primary concern for economic growth may place competing interests in a disadvantaged position in their fight for authority.” Therefore, given the rapid development of renewable energy in China thus far, the government must perceive the existence of significant economic benefits associated with renewable energy to have persuaded the powerful

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elements within the bureaucracy to support renewable energy through various policy solutions. To use Kingdon’s terms, the three issues discussed below constitute the problems stream which, when joined by the politics and policies streams, has facilitated the opening of a policy window favorable towards renewable energy. The next section of this chapter will present the first policy goal that is addressed by developing renewable energy.

**Energy Security**

Following the establishment of the People’s Republic of China, one of Mao’s major priorities was to ensure China’s self-sufficiency in all areas necessary for the nation’s well-being, including access to energy. For the first few decades of the country’s existence, “China implemented a completely autarkic energy strategy which considered quantities of imported energy, especially imported oil and natural gas, as a severe threat to national economic security.”\(^ {186} \) Although this policy was modified somewhat due to Deng’s reform and opening policies, energy security has remained a major concern for Chinese policy-makers.

With its abundant reserves, China has relied heavily on coal to meet the overwhelming majority of its energy needs, supplying roughly three-quarters of the country’s total energy consumption since 1949.\(^ {187} \) However, this tremendous reliance on burning coal for energy and electricity has produced numerous negative side effects on both the country’s economy and environment. As coal is generally mined far from where it is consumed, an extensive transport network is required to bring the

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\(^{187}\) See chapter 3
coal to where it is needed most. The vast distances between the areas in which coal is primarily produced and primarily consumed render this source of energy vulnerable to transportation bottlenecks which severely impact the country’s energy supply. Furthermore, the burning of coal is responsible for the majority of China’s air pollution, including 90% of sulfur-dioxide and 50% nitrogen-dioxide emissions, with the resultant health problems affecting the large swathes of the population. Also, at the current rate of China’s extraction and utilization of its coal reserves, the nation is set to run out of coal in the next fifty years. Due to higher prices and lower quality of domestic reserves China has been steadily importing coal, reaching 130 million tons in 2009 alone. While coal is expected to maintain its dominant share in the country’s energy mix, alternative sources to this fuel are crucial to the country’s long-term energy security.

Following the discovery of Daqing oil field in 1959, after which Mao declared China to be self-sufficient in petroleum, oil has risen to become the second-largest contributor to China’s energy mix, constituting roughly one-fifth of total consumption. However, as the economic reforms of the 1970’s facilitated explosive economic growth over the next three decades, the country’s demand for oil has quickly outstripped supply. Indeed, at current production rates, China’s oil reserves will only last another twelve years. After becoming a net oil importer in

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191 See chapter 3
1993 China’s reliance on oil imports has grown dramatically and the government has become acutely aware of the great vulnerability this reliance has created.

Table 5.1 China’s Crude Oil Imports by Source (Thousand Barrels per Day)

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<thead>
<tr>
<th>Source</th>
<th>Total 3,568</th>
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</thead>
<tbody>
<tr>
<td>Saudi Arabia, 725</td>
<td></td>
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<tr>
<td>Angola, 596</td>
<td></td>
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<tr>
<td>Iran, 425</td>
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<td>Russia, 232 Oman, 291</td>
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<tr>
<td>Venezuela, 121</td>
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<tr>
<td>Kuwait, 116</td>
<td></td>
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<tr>
<td>Sudan, 209</td>
<td></td>
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<tr>
<td>Others, 646</td>
<td></td>
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<tr>
<td>UAE, 31</td>
<td></td>
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<tr>
<td>Kazakhstan, 113</td>
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</tbody>
</table>


Government officials have since “focused on supply security and policy measures to deal with foreign dependence, especially on the Middle East and Central Asia.”

After decades of self-sufficiency, China’s dependence on the stability of foreign governments to secure the country’s energy supply has caused great consternation within the government. Indeed, “political instabilities in the Middle East, Africa, Latin America, and Russia can cause sudden falls in oil supply,” and, consequently, great damage to China’s economy. Furthermore, oil price volatility can severely affect the country’s energy security. As China’s demand for oil is expected to increase by approximately 30% per decade in this new century, “the effect of volatile global oil prices on a developing country such as China’s cannot be

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International oil price volatility has even broader negative consequences in China, where the government maintains controls on the domestic price of oil products to ensure energy commodities remain affordable. Thus, when oil prices are characterized by extreme volatility, “an oil price that is partially controlled by the Chinese government – and so [is] lower than that of the international market – causes losses for the entire oil refining industry.” As China’s thirst for oil continues to grow rapidly alongside its economic development, the country will remain increasingly beholden to factors outside of its control for the supply of its energy needs.

Two other fuel sources, natural gas and nuclear power, have been touted recently as providing an environmentally-friendlier alternative to traditional fossil fuels. While China has plans to dramatically increase the country’s use of these resources, it is important to remember that while these sources of energy are “alternative”, they are far from being “renewable”. China began recovering natural gas in 1980, after which natural gas production grew rapidly thanks to discoveries of large gas fields in several provinces. However, at the end of 2007, China had proven reserves of natural gas at only 1.1% of the world’s total. At current production rates, these reserves can be expected to last only 27.2 years, “and since production and consumption have been increasing at an ever faster rate, the reserves will probably be depleted much sooner than that.” Similarly, despite China’s ambitious plans to

rapidly increase the number of nuclear reactors, the country lacks the domestic reserves of uranium to meet these objectives. Though annual uranium production is a state secret, China’s proven reserves are estimated at around 300,000 tons, which can last China only another 10 or 20 years.\textsuperscript{198} For both natural gas and nuclear power, then, China will be forced to increasingly rely on foreign imports of these fuel sources, further jeopardizing its energy security.

As China’s use of coal increasingly threatens the country’s health and environment, and as its growing reliance on imported coal and oil leaves it vulnerable to supply shocks, the government’s pursuit of environmentally-friendly, domestically produced, and infinitely renewable sources of energy makes perfect political and economic sense. According to the International Energy Agency, “China will need to add nearly nine times as much electricity generation capacity as the United States” simply to meet demand in the coming decade.\textsuperscript{199} Indeed, China’s current low per-capita residential electricity consumption levels “indicate a staggering growth potential for residential and commercial energy use, even if China only attains world-average levels but particularly compared against OECD consumption.”\textsuperscript{200} With such a tremendous amount of generation capacity required, the government cannot accept the substantial threats that accompany an enormous reliance on imported fuel. Instead, “China is determined to meet [growing demand] with cleaner, homegrown sources so that its future economy will be less vulnerable to supply shocks and so it

\textsuperscript{198} Ibid 223
doesn’t pollute itself to death.” Although renewable energy currently supplies a very small portion of China’s overall energy mix, the government’s efforts to promote the industry and make renewable sources cost-competitive with traditional fuels is clearly aimed at strengthening the country’s energy security. Thus, “on energy security and environmental grounds, maintaining the momentum of rapid renewable energy production growth will continue to be a high strategic development priority.”

As renewable energy already provides half of all power to the provinces of Xinjiang, Qinghai, and Gansu, the government sees the potential for renewable energy to provide the country with a crucial source of safe, domestic, and clean energy. Indeed, the use of renewable energy in these three provinces is related to another important development goal to which renewable energy has already contributed significantly: rural electrification.

**Rural Electrification**

China’s rapid economic development has succeeded in lifting millions of rural Chinese out of poverty and raising their standard of living tremendously. As part of this development drive, the Chinese government has sought to provide access to electricity to the country’s enormous population. Far from being a recent initiative, “providing electricity across China, including the rural areas, has been a main concern since the founding of the nation in 1949.” The government has made significant

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progress towards this goal, and its policies have increased the percentage of the population with access to electricity from 40% in the 1950’s to 95% in 2004.\textsuperscript{204}

Despite the considerable success of these efforts, it is estimated that today anywhere between 9 and 120 million people in remote and rural areas still lack access to electricity,\textsuperscript{205} and as many as 70 million experience routine grid failure and other access problems.\textsuperscript{206} These problems were clearly illustrated following the endemic energy shortages and blackouts which assailed the country in 2003 and forced 24 provincial areas to impose power brownouts the following year.\textsuperscript{207}

The number of people suffering from little to no electricity access represents a staggering obstacle to China’s developmental goals, as millions of people have yet to experience one of the most rudimentary beneficial consequences of economic growth. Indeed, the lack of access to resources such as electricity contributes substantially to the persistence of poverty in many areas of China. This energy deficiency limits these people’s development, and “finding a feasible way to address the energy problems of the poor in the western provinces is a crucial precondition for their development and for protection of the environment.”\textsuperscript{208} Furthermore, the greater the numbers of people who feel left behind while the country’s coastal regions become

highly developed, the greater the growth of social inequity and the potential for social unrest. To maintain social stability, as well as the Communist Party’s legitimacy, the provision of electricity to these populations is absolutely essential.

However, providing access to electricity to these populations by conventional means, such as extending the grid-connected transmission network, is prohibitively expensive and therefore a poor solution to this problem. These areas are too geographically distant from the central grid, and the population densities are too small to make connection to the grid worthwhile. Indeed, “the prospect of a conventional solution to deliver modern energy services to these distant, low-load (and hence low or no profitability) markets seems further away than ever.”

Due to this problem, the government has focused on utilizing renewable energy technologies to provide electricity to these rural and remote areas and has initiated several programs towards this end.

One of the first large-scale programs undertaken to utilize renewable energy for rural electrification was the Brightness Program. Launched in 1998, the Brightness Program aimed to provide electricity to over 23 million people in remote areas, allocating 100 watts of capacity per person. This project “focused on environmentally friendly sustainable development and poverty alleviation with a high return on investment,” and has seen very positive results. The Brightness Program, which promoted the use of micro-hydropower, small-scale wind power, small photovoltaic (PV) power, and hybrids of these technologies, succeeded in providing

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electricity to 30 million members of the population who still had no access to electricity.\textsuperscript{210}

Additionally, the project facilitated “the establishment of local and national government bureaus of financing, technical training systems for local technicians and engineers and production enterprises geared toward meeting electricity needs.”\textsuperscript{211}

This project successfully demonstrated the capacity for renewable energy to make a lasting difference in improving the lives of millions of people through the provision of clean and reliable electricity and providing a solid foundation for further economic and social growth in these areas.

To capitalize on the success of the Brightness Program, in 2001 the government initiated the National Township Electrification Program. Using solar PV, small hydro-electric, and wind power technologies, this program electrified more than one-thousand townships and over one million people in nine western provinces, including Xinjiang, Qinghai, Gansu, Inner Mongolia, Shaanxi, Sichuan, Hunan, Yunnan, and Tibet. In total, the program installed 20 MW from PV, 840 kW from wind, and 200 MW from small hydropower, with the government providing $240 million to subsidize the capital costs of equipment.\textsuperscript{212} Though information remains scarce, this program was followed by a similar one focusing on villages, “with plans to electrify 10,000 villages and 3.5 million rural households with renewables by 2010, including small hydro and up to 270 MW of solar PV. Full rural electrification is

planned by 2015.” Renewable energy has thus been crucial in meeting one of the government’s longest-standing development objectives to bring electricity to its entire population.

By providing these remote areas with electricity using renewable energy, the Chinese government has made significant progress in improving the livelihood of millions of rural Chinese, reducing poverty, and bringing the fruits of development to those who need it most. Indeed, renewable energy systems have brought tangible social and economic benefits to the populations that have so far been largely neglected by current development patterns. Such benefits include “the ability to refrigerate food and medicine, the provision of lighting for household needs, evening adult and children’s classes, and power for small electric motors (such as water pumps) to assist rural economic development.”

Although the amount of power provided by these renewable energy systems is relatively small compared to the energy consumption of urban residents, the energy provided has an enormous impact on the lives of those who would otherwise be without electricity. By providing enough power to enable the use of television sets, rural residents are given an “information window” from which they can not only derive entertainment, but also “local, national, and international news and cultural information impossible to obtain by other means in remote locations.” In this way, renewable energy has provided direct economic and quality of life benefits to millions.

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of rural Chinese, presenting a powerful incentive for the government to continue its support and investment in the industry.

Also, as a consequence of rural electrification programs and other development policies utilizing renewable energy, the Chinese government has facilitated the creation of a substantial market for renewable energy companies. For example, China’s Township Electrification Program is by far one of the largest renewable energy-based rural electrification programs in the world. The millions of people now using renewable energy technologies represent “enough critical mass to create a truly robust and sustainable renewable energy infrastructure in China, especially for PV.” With government subsidies and favorable tax and pricing policies, renewable energy has become an increasingly viable energy source for the country as a whole, and China’s experience in rural electrification using renewable energy technology provides important lessons for other developing countries with similar electrification goals. As commercialization of renewable energy technologies expands, considerable market opportunities will develop for international, joint venture, and wholly domestic renewable energy companies to exploit in the future. Consequently, numerous renewable energy companies have sprung up in recent years to meet the growing market demand for these technologies, with some Chinese companies becoming world leaders in the industry. As more companies are established, renewable energy has the potential to satisfy another constant issue for China’s economic development: employment.

Employment and Economic Growth

The renewable energy industry, from research and development, to management, operations, and maintenance, has employed a growing number of people to fuel its dramatic growth. As the legitimacy of the Communist Party rests largely on providing continuous economic growth, the creation of new sources of employment for its expanding population remains crucial to the regime’s survival. In China, “growth and political legitimacy are intricately linked, and the political leadership take very seriously the prognoses that social stability will be jeopardized if growth falls.”

Although renewable energy remains a small industry today compared to, for example, the coal industry, which employs 60% of all people working in the energy sector, the government’s ambitious renewable energy targets have generated significant investment in this industry. In 2007, the NDRC released its Medium- and Long-Term Development Plan for Renewable Energy in China which established the goal of raising the share of renewable energy in the country’s total primary energy consumption mix to 10% in 2010 and 15% in 2020. As ambitious as such targets appear, though, they were apparently too conservative. In 2008, “China’s total wind power doubled for the fifth year in a row, ending the year above 12 GW and breaching China’s 2010 development target of 10 GW two years early.”

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Furthermore, experts predict that the 30 GW of cumulative installed wind capacity by 2020 will be achieved by 2012, leading the NDRC to consider “increasing its target for 2020 from 30 GW to 100GW, more than the total global accumulated installed wind energy capacity at the end of 2007.”

Similarly, China is expected to exceed its original 2020 target of 1,800 MW installed solar capacity ahead of schedule, prompting the government to propose “a new target of 2 GW for 2011 and 20 GW for 2020 under the Renewable Energy Development Plan.” Indicative of the industry’s enormous potential, the rate of China’s renewable energy development has surprised even government officials who have been forced to revise their targets further upward in order to keep up with the industry’s explosive growth.

The Chinese government’s renewable energy policies and targets have generated enormous activity in this sector, which has produced millions of jobs with the potential to employ ever larger numbers of the working population in the near future. As governments around the world issued large stimulus packages in recent years to cope with the current global economic crisis, China devoted a substantial amount of its huge stimulus program to generating “green” jobs. Indeed, “the green portion of China’s stimulus package is regarded as very positive policy support for the renewable energy industry,” with $30 billion of the $586 billion package directly earmarked for green investments, and $221 billion for projects with green features including grid and infrastructure investments. According to the government-backed Chinese Renewable Energy Industries Association the renewable energy

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222 Ibid 5
223 Ibid 10
industry has been “adding jobs rapidly, reaching 1.12 million in 2008 and climbing by 100,000 a year.” The NDRC also expects the renewable energy industry to employ an increasingly larger number of workers, estimating the figure to be around 2 million jobs. Although impressive on their own, the sheer number of jobs is made more attractive due to the high quality of such employment opportunities in the renewable energy sector, with many considered to be highly skilled, high-tech jobs.

While the renewable energy industry has already created a substantial number of jobs in China, several studies have been published detailing the potential job opportunities provided by the development of renewable energy. Importantly, however, while such studies calculate the number of jobs created directly by the renewable energy industry, jobs will also be created indirectly by the growth of this sector. For example, as renewable energy generation projects are expanded, laborers will be needed to construct the transmission and distribution networks, especially in areas with undeveloped or underdeveloped grids where renewable energy applications are often most suited.

One study indicates that not only does renewable energy hold the potential to generate a significant amount of new jobs, but it also produces more jobs than the fossil-fuel based sector per unit of energy delivered. According to the report “Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?”, the solar PV industry generates 5.65 person-years of employment per million dollars.

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226 Ibid 227
in investment over ten years, while the wind energy industry generates 5.7 person years of employment per million dollars in investment. By contrast, “every million dollars invested in the coal industry generates only 3.96 person-years of employment, over the same time period.”\textsuperscript{228} Another report by the U.S. Worldwatch Institute estimates that generating one billion kilowatt-hours of electricity from coal or nuclear fuels requires only 100 to 116 workers, “while a solar thermal facility provides 248 jobs and a wind farm provides 542 jobs.”\textsuperscript{229} Furthermore, a study undertaken by Greenpeace in 2008 examined the impact on employment due to renewable energy in Germany, Denmark, Spain and the Netherlands. This report demonstrated that “for every megawatt of new capacity in wind energy, 15 jobs (in person-years) will be created…[and] for every megawatt of new solar energy capacity, up to 35.5 jobs will be created.”\textsuperscript{230} Though such numbers were derived from data obtained in more developed countries, the potential for renewable energy to provide a significant amount of new jobs is obvious. Indeed, due to the lower labor costs in developing countries than in the developed world, these findings suggest that renewable energy will be more competitive in developing countries like China than in developed countries and will employ larger numbers of people. Furthermore, unlike the low-skilled, low-paying, and relatively dangerous jobs created by the extractive energy industries, the renewable energy industry will generate many high-skilled, high-tech, and high-paying manufacturing jobs.

\textsuperscript{228} ibid 12
Significantly, due to the geographic distribution of renewable energy resources in China, the areas which experience the greatest renewable energy development will often be some of the least developed in China. In this way, the jobs generated by the growing exploitation of China’s renewable energy resources will be concentrated largely in the southern and western regions of the country whose populations have thus far experienced little gains from the country’s rapid economic development. As China moves to increase its utilization of renewable energy, “a ‘green’ transition would help the poorest provinces, and the overall energy transition would most likely reduce inequality in China, which has been growing since reform and opening-up.” While China’s demand for energy is expected to grow rapidly in the coming years, and with government plans in place to dramatically increase the share of renewable energy in the country’s total energy mix, the renewable energy sector will likely serve as an important source of future job growth in the Chinese economy and contribute substantially to reducing poverty and social inequity by concentrating job growth in the poorer, western areas of the country.

Apart from the provision of employment, the renewable energy sector represents a powerful new source of economic growth for the country. As China remains “the world’s factory,” the country’s renewable energy industry has quickly established itself as a major exporter of renewable energy technology and equipment. Indeed, China has already become a dominant player in key areas of the renewable energy industry. In 2009, China “vaulted past competitors in Denmark, Germany, 

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\section*{Conclusion}

Although the international community has increasingly urged China to reevaluate its economic and energy policies so as to account for their impact on the health of the global environment, particularly the global climate, the convergence of these pressures with significant domestic political and economic priorities within
China have influenced the politics stream of policy-making by creating a political atmosphere in which many important policy actors can find reasons to promote and support renewable energy policies. As China’s economy has grown tremendously in the past few decades, so, too, has its thirst for energy to sustain this monumental growth. Despite China’s abundant reserves of coal and modest reserves of petroleum which have provided the foundation for the country’s energy use, these reserves have never been able to fully satisfy the country’s total energy needs. In recent years China has been forced to import ever greater amounts of coal and oil from abroad to the detriment of its national security. With more and more of its fuel sources originating in countries around the world, from Africa to Latin America, the Middle East and Central Asia, the security of China’s fuel supply, and therefore its economic growth, lies further outside of the government’s control. In this way, domestically produced and environmentally friendly renewable energy can provide a reliable source of energy to the benefit of the country’s energy security.

Furthermore, renewable energy also provides a solution to the government’s goal of providing electricity to the most remote and rural areas of the country. As these populations have experienced little benefit from the country’s rapid economic development, it is vital that the government find cost-effective ways to improve their livelihood and provide a basis for their continued development. Using renewable energy technologies, these communities can now utilize local renewable resources to power everything from lights and refrigerators to televisions and irrigation pumps, thereby improving their standard of living and forming a basis for rural economic growth. Also, the growing utilization of renewable energy has already generated
millions of jobs with the potential to employ even more as the industry continues its rapid expansion. Not only does the renewable energy sector employ more people per unit of energy produced than fossil-fuel based industries, but the jobs created will disproportionately go to people living in the poorer western and southern regions of the country with the most renewable energy resources.

Finally, as the government has become increasingly aware of the negative impacts a deteriorating environment has on economic growth, the utilization of environmentally friendly technologies like renewable energy are vital in maintaining strong economic growth without continuing to sacrifice the environment. Renewable energy, due to its lack of harmful emissions and pollution, typifies the type of solution China must continue to develop in order to expand the country’s economy in a sustainable way in the future. Thus, the potent economic and political benefits provided by renewable energy coupled with sustained international pressure on China to clean up its environment have served to create a policy window for the government to support the rapid development of the renewable energy industry.
Conclusion: The Convergence of International and Domestic Pressures

This thesis has sought to address the recent phenomena of China’s rapid promotion and development of a world-class renewable energy industry. With the country’s wind power capacity doubling each year between 2004 and 2009 and small hydro-electric capacity increasing by 4-6 GW annually from 2004 to 2008, the speed of China’s development of renewable energy has caught many by surprise. Despite its developing country status, China now ranks second in the world behind the United States in terms of total installed wind capacity and leads the world in the production of solar photovoltaic (PV) technology. The speed of China’s renewable energy development has taken even the government by surprise, with the National Reform and Development Commission revising its targets for solar capacity from 1,800 MW to 20 GW by 2020 and considering to revise its targets for wind generation capacity from 30 GW to 100 GW by 2020. Given China’s manufacture and utilization of renewable technology lagged far behind every developed country just a few years ago with, for example, only 80 MW of solar PV capacity in 2006 compared with more than 7700 MW globally, this development represents a truly remarkable achievement.

Considering the country’s overwhelming historical dependence on its domestic reserves of coal and the government’s overriding priority of domestic

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growth at the expense of environmental degradation, the development of a renewable energy industry supported by favorable government policies seems unexpected and inexplicable. Though environmental pollution has become an increasingly serious problem for the health of the country’s population and has even been shown to have substantial negative consequences on the country’s economic growth through measures such as the “Green GDP,” few reasons appeared to exist suggesting that the government would abandon its long-held policy of “develop first, clean up later” and devote so many resources to developing its renewable energy sector.

While the domestic political and economic benefits of renewable energy described in the preceding chapter appear to be powerful reasons for the government to develop this industry, it is unclear that such benefits, alone, can explain the tremendous government activity in supporting and promoting this sector. The domestic issues for which renewable energy provides a solution have existed in China since its foundation and, while such technologies have indeed been utilized to address these problems before, the government’s interest in this area has never reached the level apparent in recent years. Instead, the growing international consensus on the need to address global environmental problems such as climate change through steps to reduce countries’ emissions of greenhouse gases, of which transitioning from a dependence on fossil fuels to renewable resources constitutes a major part, has facilitated a change in the domestic political environment which has made policies promoting renewable energy technologies more desirable amongst a wider variety of government ministries and agencies.

241 For example, the government has used large and small hydropower to diversify the country’s fuel mix and provide electricity for rural residents, respectively.
Reflecting the work of John W. Kingdon and his description of three “process streams” which flow through the policy-making system, the development of international environmental norms, in conjunction with China’s continuing desire to become more involved in the international community, the serious negative environmental consequences of the country’s economic growth, and the existence of longstanding policy problems such as energy security, rural electrification, and employment generation, have all combined in recent years to create a “policy window” in which proponents of renewable energy can successfully push for their favored policy solutions to be adopted. Using Kingdon’s terms, the problems stream has been China’s rising pollution problems, environment-related crises, and the three longstanding problems discussed in Chapter 4, the policies stream has consisted of policies promoting renewable energy, and the politics stream has been the development of an international environmental consensus which has led the Chinese government to adopt the concept of sustainable development and China’s desire to be seen as proactively participating in the international community. Thus, the convergence of growing international norms of sustainable development strategies and the existence of pressing domestic political and economic issues have provided an opportunity for proponents of renewable energy to advocate their policy solutions to these various problems.

Although renewable energy technologies have existed for decades, as have China’s longstanding issues with energy, development, and employment, it was not until an international consensus on the need to address global environmental problems created a favorable atmosphere within China in which policies designed to
promote renewable energy could be advocated and seriously considered by the more powerful government ministries. In this way, international pressure and domestic political and economic priorities coincided in such a way as to generate a greater interest amongst the various government actors in renewable energy, facilitating the government’s promulgation of aggressive and ambitious policies to develop this new industry.

**Contributions to the Literature**

In evaluating the various pressures within and outside China which have contributed to the country’s recent rapid development of a renewable energy industry, this thesis offers three significant findings: First, traditional models explaining the interactions between an international government negotiator and the domestic policy-makers as well as between the negotiator’s foreign counterpart, which have largely been focused on democratic regimes, can be applied to non-democratic states with relative ease. Second, John W. Kingdon’s work detailing the processes of agenda-setting, alternative specification, and public policy adoption, which also dealt with the democratic government of the United States, hold true with an authoritative government such as China’s. Finally, by evaluating international efforts to persuade China to address environmental issues and what appear to be China’s key domestic arguments for pursuing renewable energy, it is clear that environmentally-minded policies can be successfully promoted in economic terms for developing countries.

While most studies focusing on the role of international norms in shaping a government’s domestic policy have concentrated on democratic states, this paper has demonstrated that many assumptions for democratic governments negotiating on the
international level can also hold true for authoritarian ones. Robert Putnam’s characterization of the politics of international negotiations as a two-level game, where a negotiator must balance the numerous pressures from the national and international level, can be used to a certain extent to describe the politics of international negotiations even in non-democratic countries.

Although the Chinese Communist Party faces little pressure from organized civil society groups, the nature of the government bureaucracy, with ministries and agencies seeking to maximize their own political and economic interests, provides an equally powerful source of domestic pressure on government negotiators. For example, in climate change negotiations, the ministries from which the lead delegates are drawn often provide a key indication of which issues are China’s main concerns at that particular moment. When China’s lead negotiators at the Copenhagen Conference on Climate Change came from the conservative National Development and Reform Commission (NDRC) and the Ministry of Foreign affairs instead of from the more environmentally-minded Ministry of Environmental Protection or the State Science and Technology Commission, it is clear that economic development and energy security were the main priorities of the Chinese delegation, with conservation and pollution abatement receiving only secondary consideration. Therefore, despite its authoritarian nature, the Chinese government still must reconcile the competing interests of its constituent ministries and government agencies at every level with the country’s overall foreign policy goals and strategies.

Similarly, this thesis demonstrates that Kingdon’s work regarding the existence and nature of process streams in the identification, consideration, and adoption of public policies in the United States is also useful for understanding the policy process in a non-democratic country like China. Although Kingdon identifies political actors, such as the President, Congress, and civil servants, as well as non-government actors such as interest groups, academics, the media, and public opinion as crucial to the process of agenda-setting and policy specification, similar actors exist within authoritarian China and they exert a comparable influence on the policy-making process. While the central leadership, consisting of the Central Committee and Politburo, exercises significant authority, the devolved nature of China’s political system allows actors at all levels of government to affect the identification of problems and adoption of policies. Also, notwithstanding all non-governmental organizations must be sanctioned by the government, these organizations play a vital role in collecting and distributing information for policy-makers, and there has been a growing trend to involve more think tanks and academics in the policy-making process.\textsuperscript{243} Furthermore, Kingdon’s concept of a policy window, which is created when the problem, policy, and politics streams converge, clearly holds true in non-democratic countries which, while experiencing less government accountability, still remain subject to similar pressures, problems, and political processes that give rise to these process streams in democracies. In this sense, the nature of agenda-setting as well as policy specification and adoption in non-democratic China appears largely congruent to Kingdon’s conception for democratic states like the USA.

\textsuperscript{243} Ibid 189
Another important contribution of this thesis is the recognition that growth-first agendas can, counter intuitively, result in some environmentally beneficial policies. Throughout its history, the Chinese government has followed a policy of “develop first, clean up later,” driving it to pursue unrestrained economic growth at the expensive of environmental degradation. Despite growing evidence that these mounting environmental problems have considerable negative effects not just on the country’s natural beauty but also on the population’s health and even economic growth, the government has thus far taken minimal steps to begin reversing this process as such measures have been seen to be detrimental to China’s development. Indeed, environmental awareness has often been viewed as a “rich country” luxury by developing countries, who insist that only when a minimal standard of living has been reached can they begin to worry about enhancing the quality of life with a cleaner environment. Developing countries argue that they must devote their limited resources towards the more immediate problem of improving the economic livelihood of their citizens before they can direct resources towards “luxury” items like cleaner water and air. Thus, until recently China participated in international environmental regimes only when it was either a small contributor to the problem being addressed or when sufficient financial and technical assistance was provided to aid its compliance.

As a growing international environmental consensus has raised the profile of renewable energy technologies as a tool to decrease harmful emissions, the Chinese government has recognized the utility of such technologies in meeting important economic and developmental goals. With generous assistance from multilateral organizations and bilateral partners, renewable energy became an increasingly viable
solution to some of China’s longstanding political, economic, and development issues. In this way, though the international community promoted renewable energy for its environmental benefits, China’s adoption and expansion of the use of these technologies resulted mainly from the non-environmental advantages they presented. By framing environmental measures in ways convergent with a developing country’s economic and developmental objectives, such policies can be made more palatable to a development-minded government.

**Policy Recommendations**

These findings also suggest several policy recommendations.

First, it is clear that despite China’s desire to be seen as a constructive and leading power in the changing international order by expanding its participation in international and multilateral fora, this desire is greatly overshadowed by the desire to continue the country’s economic growth and development. Because of this, the Chinese government will resist and, as evidenced at the recent Copenhagen Conference on Climate Change, even help block international efforts that it sees as detrimental to its economic imperative. For the Chinese government, economic growth and development are intimately tied to political stability and the Communist Party’s legitimacy. Therefore, any international efforts designed to promote policy change within China which are viewed by the more powerful government ministries as potentially detrimental to the nation’s economic well-being will likely fall on deaf ears.

As demonstrated in Chapter 3, at all international environmental conferences and treaties to which it was party the Chinese government forcefully and consistently
couched its involvement in terms of the potential negative economic consequences of participation. Only when China was a relatively small contributor to the problem addressed by the treaty or when significant financial and technical assistance was provided to aid in its implementation did the government acquiesce to international norms. Thus, when advocating policy change in China, as in any developing country, if these changes are viewed as economically damaging and are financially unsupported by the international community then the success of achieving that change will be highly unlikely. Instead, environmental policies should be promoted using political frames that focus on the economic benefits such policies would bring.

The three major domestic issues which renewable energy technologies have addressed in China are not unique to that country, but constitute some of the central challenges of any developing nation. In this sense, by using China’s success in this area as an example to other countries and providing similar financial and technical support, the likelihood of positive environmental policy change can be dramatically increased.

Additionally, while China’s expansion of a renewable energy industry has grown rapidly thanks to supportive government policies, further policy reforms are needed to ensure greater efficiency. For example, China’s Renewable Energy Law, based on European “feed-in” tariffs, requires utility companies to purchase the power generated by all renewable energy projects in their area of operation. While this law has succeeded in creating a dependable market for renewable energy producers, the link between renewable energy pricing at source and grid distribution has proven rather problematic. Because the law mandates that utility companies pay higher
prices for power generated from renewable energy than for power generated from
dirtier sources such as coal, utility companies have very little incentive to connect
renewable energy projects to the grid. This has led to the troubling situation that
while China’s wind generating capacity continues to soar, over a quarter of the
currently available capacity is still not connected to the grid. Clearly this situation
is enormously wasteful and inefficient and will be harmful to the industry’s long-term
economic prospects. These findings suggest that crafting creative incentive packages
that could help China overcome these policy and infrastructure weaknesses would be
a highly effective and relatively low cost area where the international community
could direct its political efforts.

**Conclusion**

China has the largest population of any country on our planet, and is also the
largest emitter of greenhouse gases, with emissions projected to continue growing
dramatically into the near future. How China copes with the increasingly dire
environmental problems that it did not create, but is now a substantial contributor to,
is one of the most important challenges for the twenty-first century. This is true not
only due to the potential negative consequences of its own development, but also
because of the example it sets for other developing countries whose own development
will likely wreak havoc on their local environments. As China’s stature continues to

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rise in the international community, its actions will be closely watched by its
developing country allies and perhaps even imitated, for better or worse.

Similarly, China’s decisions regarding climate change will have enormous
ramifications on developed countries, such as the United States, with influential
segments of the population looking for any excuse to delay or avoid taking positive
action in their own countries. While China’s embrace of renewable energy is a
remarkable achievement, it is by no means a comprehensive solution for the country’s
mounting environmental catastrophe. The steps China takes to further its economic
development and address its environmental crises will have enormous consequences
for every country in the world.

As a rising global economic and military power with a strong authoritarian
government, China has often been treated by political scientists as an exception.
While the problems are indeed dire, this thesis offers several areas that can give us
hope moving forward. Although it may have an authoritarian government and
although its main policy objectives remain oriented toward economic growth rather
than environmental sustainability, China’s politics are amenable to policy-making
theories developed in order to understand more democratic countries. By utilizing
these theories, such as Putnam’s two-level game and Kingdon’s process streams in
domestic agenda setting and policy-making, we can find productive ways to direct
international pressure to help those working within the Chinese government choose
policies that help their country, and the planet.

China’s environment, along with our global ecosystem, remains in a perilous
state. However, as new technologies and innovative policies are developed and
demonstrate both their environmental and economic credentials, there is reason to hope that our collective futures may be cleaner and healthier than our polluted present.
References


