Chapter 3 Revisiting China's climate policy: The climate-energy conundrum point of view

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Abstract

When encountered the emergence of the multilateral climate governance, China showed hostile stance, opposing against have obligation to reduce greenhouse gas emissions. However, it has gradually changed the stance to accept a non-obligatory reduction of carbon intensity, and to be proactive in the reduction. Meantime, it has implemented a number of climate policy measures.

Against this backdrop, this chapter aims to explore what changed its hostile stance toward proactive one through a revisit to the policy process and policy outcomes that the Chinese government has taken to address the climate-energy conundrum, discussing the effectiveness of the policy outcome and logical consequences that will cause by enhancing the outcome.

The findings can be summarized as follows. First, China's climate policy has been centered on energy development strategy, thus framed as energy policy. However, detailed policy measures have been adjusted to incorporate vested interests of local governments and national oil companies (NOCs), government desire to create new growth point, and emerging heath concerns into account to make it realistic and effective. Second, the resultant climate-energy policy provokes conflicts of interests among provincial governments, NOCs and distributed energy producers, which blocks changes in energy mix from accelerating, and impairing the structural effect in CO_2 emission reduction. Such domestic conflicts of interests is shifting the government focus toward "going global" of coal and hydropower industries, which can cause international disruption of livelihood and ecology, and directs the energy infrastructure system of foreign countries toward a high CO_2 emission pathway.

1. Introduction

As stated in Chapter 1, China has shifted the notion of energy security from proper and smooth domestic supply stable supply under the planned economy to the appropriate mix of energies and the way to access them under the socialist market economy, in line with the macroeconomic and State of Enterprises (SOEs) reforms. The Communist Party of China (CPC) and the state have perceived economic growth, poverty alleviation, and social stability as the foundation of their legitimacy and have thus placed them as their top priority. They recognized that rapid economic growth was associated with increasing energy consumption, and that an energy shortage had become the bottleneck of economic growth. The international hike in energy prices in the mid-2000s alerted the Chinese government that excessive dependence on fossil fuels would also become a bottleneck. But rapid expansion of production capacity increased inefficiency in energy production and consumption, and caused serious air pollution. It also went through a massive increase in greenhouse gas (GHG) emissions, making it as the world largest GHG emitter. The United States threatened to impose a border carbon adjustment.

Chinese researchers refuted this threat, claiming that most of the CO_2 emissions in China were accrued by industrial production for export, which contributes to a high level of consumption with a low level of CO_2 emission in developed countries (chapter 2 in this volume). The Chinese government also refused to accept a legally binding GHG emissions reduction target, insisting on the common but differentiated responsibility.

Against mounting international pressure toward its urgent commitment, however, they gradually changed its hostile stance. Chinese researchers began to insist on China's contribution to a gradual commitment to GHG emissions reductions, especially to the absolute emissions cap with technology transfer and financial support (see Zhang 2011). The Chinese government has outpaced the Chinese researchers' insistence, setting out the 40-45 percent reduction target for GHG emissions per GDP by 2020 prior to the 15th Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in 2009. It went further in the 2014 China-US Summit, submitting a pledge to reduce GHG emissions per GDP at the 2005 level by 60-65 percent by 2030 and to reach its CO_2 emission peak no later than 2030.

This poses a question as to what convinced the CPC and the state to change their minds and take a step toward a GHG emissions reduction. Climate change tends to be used, where compatible, in the context of entrenching energy interests, while no consistent association can be seen between climate change and energy security (Toke and Vezigiannidou 2013). The incentives for the political elites to support the transformation of an energy system for the sake of GHG emissions reduction and for the state to intervene vary dramatically depending on the political-economic setting (Lockwood 2015).

To answer this question, this chapter revisits the policy process through which the Chinese government has gone to reconcile CO_2 emission reduction with energy security, and the resultant policy and institutional outcomes.

2. A brief history of development

The first serious commitment was the release of China's National Climate Change Program in 2007 that outlined objectives, basic principles, and key areas of actions as well as policies and measures to address climate change for the period to 2010. The CPC supported the commitment by including the notion of a "conservation culture" in its political report to highlight emission and energy issues as new policy focuses (Chen 2012). Setting up of the National Leading Group to Address Energy Savings, Emissions Cutting, and Climate Change, headed by Prime Minister Wen Jiabao, and assisted by the ex-NDRC commissioner and the ex-Foreign minister, the Chinese government has taken a top-down approach to implement a series of stringent policies, programs, and institutional changes toward low-carbon development (UNDP China 2012).

The National Leading Group led a discussion over the target for a GHG emissions reduction, resulting in a reduction target of 40-45 percent per GDP in 2009. In accordance with this target, the 12th Five-year Plan (FYP) (2011-15) set a mandatory target to reduce carbon intensity by 17 percent based on 2010 levels, coupled with a new target for energy intensity reduction by 16 percent.

To achieve this target, the central government launched two pilot programs at the local level. One is a National Pilot Program on Low-Carbon Provinces and Cities in July 2010, under which five provinces and eight cities were selected as pilot communities. In 2012 its scale was expanded to cover additional provinces and cities, including Beijing, Shanghai, Hainan Province, and Shijiazhuang in Hebei Province. In the pilots, the development of goals and principles is required, including exploring “low carbon green development models” and establishing measuring and reporting systems for GHG emissions and plans to curb those emissions (Nachmany et al. 2015).

The other one is the pilot carbon emission trading scheme (ETS). Five cities and two provinces—Beijing, Chongqing, Shanghai, Shenzhen, Tianjin, Guangdong, and Hubei provinces—were selected as pilots and launched in 2013-14. The scheme and coverage differ by city/province, in part due to their different economic structures, but also in order to better find an optimal way that reconciles the current intensity target with the total emission control assumed under the cap-and-trade emission trading scheme that will be implemented in 2017.

In the 2014 China-US Summit, the Chinese government went further to pledge a 60-65 percent reduction in GHG emissions per GDP based on the 2005 level by 2030, reaching its CO_2 emission peak no later than 2030. Along with a target to increase the share of non-fossil fuels in primary energy consumption up to 20 percent, the Chinese government submitted this target as its intended nationally determined contributions (INDCs). Subsequently, the 13th FYP (2016-20) set a mandatory target to reduce the carbon intensity by 18 percent based on 2015 levels, coupled with a mandatory target of a 15 percent reduction in energy intensity.

3. Features

3.1 Centered on energy development strategy

This short description of China’s history in this area indicates that the Chinese government has not implemented any detailed policy measures that directly affect CO_2 emission reduction. It has been centered on the energy development strategy, and implemented as a part of it.

The long-standing concern about energy security and the framing of climate change as an issue of development (NDRC 2007a) prompted the Chinese government to put a priority on new energy and energy efficiency that can safeguard energy security instead of policies that purely serve the purpose of emissions reduction that can put a brake on economic growth. Faced with limitations and rising cost of domestic energy production, the Chinese government changed its stance on energy security and regarded the additional development of oil and gas around the world as enhancing the energy security of China through increasing global energy security (Hayashi 2006) to justify foreign investment and imports.

This top leaders' stance determines the inter-agency system that designs the climate change strategy. The National Development and Reform Commission (NDRC) and the Ministry of Foreign Affairs are authorized to take charge of making a climate change strategy, not the State Environment Protection Administration or the Meteorological Administration, who would be more concerned about the impact on climate change. As the Ministry of Foreign Affairs plays a major role in international negotiations in view of the protection of state sovereignty and the enhancement of China's international image, the NDRC plays a dominant role. As the economic planning and energy regulation agency, the NDRC hopes to utilize climate change as a moral driving force to boost clean energy and other green industries (Chen 2012: 100). This makes China's climate change policy a part of its clean energy development strategy, focusing on mitigation rather than adaptation. It assumes that GHG emissions will be mitigated as fringe benefits of clean energy development. In this regard, the Chinese climate change policy can be renamed an climate-energy policy.

The National Climate Change Programme 2007 highlights the development of renewable and nuclear energy, energy efficiency and energy conservation, and a circular economy and emissions reduction as key areas for mitigation actions. This programme was based on the Chinese government's perception that an increase in foreign reliance poses the risk of an external debt crisis under the insufficient foreign reserves at that time. The Chinese government outlined its energy intensity target and revised the Energy Conservation Act to clearly appoint a responsible entity for energy conservation. It also initiated several complementary programs, namely, (a) the Top 1000 Energy-Consuming Enterprises program (Top-1000 program), (b) the Ten Key Projects program, and (c) the Small Plant Closure and Phasing Out of Outdated Capacity program.

3.2 Top-down decision with local enforcement

The Chinese government takes the traditional implementation strategy of top-down decision of guidance with decentralized enforcement: It plans a strategy that resembles its economic strategy under the Reform and Open-door Policy: China's leaders provide administrative and legal guidance but devolve far greater authority to provincial and local officials, they utilize campaigns to implement large-scale initiatives, they embrace the market as a force for change, and they rely on private citizen initiatives and the international community to provide financial and intellectual capital (Economy 2004: 91). The central government provides the carbon and energy intensity targets, allocates the target, and delegates the responsibility to leaders in provincial governments, taking different economic structures, efficiency options, and levels of wealth into account. Their responsibilities are further strengthened in the National Plan for Tackling Climate Change (2014-20), in which all provinces and municipalities were mandated to develop their own plans as well as to establish a provincial Leading Group to Address Energy Savings, Emissions Cutting, and Climate Change.

The central government also implemented more stringent regulations targeted specifically at coal power plants, consisting of (a) the prohibition of construction and expansion of coal power plants in large and medium-size cities, (b) a mandate on the installation of fuel-gas desulfurization (FGD) at new coal power plants, and (c) the replacement of small and obsolete coal power plants with large and efficient ones. It also implemented coal price reform to reduce coal demand and provide higher revenue for the consolidated coal miners to invest in safety and health.

However, these top-down administrative measures encountered an implementation deficit at the street level. Local industrial plants and coal power plants continue to operate and discharge severe emissions while those of state enterprises do not fully run at capacity, even though they scrapped old plants and built large, efficient plants that are equipped with FGD and discharge less emissions (Horii 2006). This is not only because they cannot afford to renovate their plants and install FGD, but also because the local governments prefer the construction and purchase of power from of locally owned coal power plants. The local environmental protection bureau (EPB) and judicial authorities impose less stringent enforcement under the authority of their local governments due to funding and human resource management, as well as due to a lack of necessary monitoring and enforcement mechanisms, such as on-line continuous monitoring systems.

To tackle the implementation deficit, the central government employs stick and carrot measures. As a stick, it implemented the “down-by-one-vote system”, under which the central CPC does not approve the promotion of local political leaders or presidents of state enterprises who are evaluated as having poor results in terms of energy efficiency and pollution reduction, even if they are evaluated as excellent in terms of local economic growth.

As a carrot, it has increased government financial support for massive deployment of clean energy and technologies. The central government made huge investments in developing natural gas fields in the western region of Sichuan and Xinjiang, as well as gas pipeline and electricity transmission lines to deliver energy from the western to the eastern region. It has also increased investments in coal gas supply and district heating systems in the name of environmental protection investments (Figure 3-1). It capitalized on its four trillion yuan stimulus package to massively and widely deploy solar heating into rural households amid the global financial crisis in 2008.

The government initiated forced closure of small and inefficient coal mining, boilers, and power plants to consolidate the coal industry and to tackle air pollution and domestic acid rain in the late 1990s. This measure, however, deteriorated performance of heavy industries and infrastructure that remained the backbone of economic development (Cheng 2013) and caused frequent blackouts that were a bottleneck of economic growth in the early 2000s. This upset the government, which cancelled the forced closure and invested in state coal mining. At the same time, the government raised coal prices to take safety and environmental costs into account and scrapped the coal tariff in 2007 to allow coal imports. These measures boosted coal consumption for industrial use, resulting in an increase in coal production and imports (Figure 3-2). Nonetheless, the prohibition of operating license renewals for coal mines that did not satisfy the stringent safety and recycling standards, coupled with the raise in coal prices that enabled coal miners to take safety and recycling costs into account, helped the government to attain the SO_2 emission reduction target in the 12th FYP despite its failure in the 11th FYP (2006-10). The central government's 4 trillion yuan investment and monetary relaxation policy during the global financial crisis boosted their investments. These resulted in the failure to attain the energy intensity reduction target in the 11th FPY, despite last-minute shutdown operations of large industrial plants coupled with restriction on electricity use across the country. Their investment in this period generated excess production capacity and caused severe and visible air pollution in many cities since 2011.

3.3 Profit-driven

The third feature is that it is profit driven. China's three main national oil companies (NOCs) of China National Petroleum Corporation (CNPC), the China Petroleum and Chemical Corporation (SINOPEC), and the China National Offshore Oil Corporation (CNOOC) became more autonomous and powerful in the decentralization process (Zhang 2016). While they are motivated to expand oil and gas reserves and production, diversify the energy supply, become international state oil and gas companies, develop an integrated supply chain, capture technological know-how, and streamline their management capacities (IEA 2014), they hesitated to acquire resources and technologies, especially in countries with authoritarian regimes or ministry control that disregards human rights (Halper 2010).

To mobilize them as implementing entities of the climate-energy policy, the Chinese government has proactivity pursued a strategic bilateral relation with key energy producers and resource-rich countries in Central Asia, Africa, and Latin America, especially countries whose leaders wanted to reduce the influence of the United States or that the United States had lost political interest in after the Cold War. Chinese state oil and gas companies have exploited their long-standing ties with the CPC leadership to advance their corporate interests in foreign countries to make the project commercially viable (Patey 2014).

In addition, it offers energy-backed loans and resource-financed infrastructure in concluding profit-sharing agreements and long-term purchasing contracts on oil and natural gas to hedge energy exploitation and default risk (Tunsjø 2013). Capitalizing on over US$ 1 trillion of foreign reserve[1], the CDB and the Export-Import Bank of China (CEXIM) have provided loans for oversees upstream equity investments in oil and gas mining and in resource companies (Takehara 2009). They have employed a loan for oil or a resource for infrastructure arrangements that is securitized against the net present value of a future revenue stream from oil or resource extraction (Sanderson and Forsythe 2013; Halland et al. 2014), despite the agreement on the restrictive use as a competitive tool to secure deals among OECD member countries (Cáceres and Ear 2013).

It is not limited to oil and gas industry that is given profit motives. Benchmark pricing, or de facto feed-in-tariff was implemented to coal power in 2004, offshore wind in 2009, solar PV in 2011 and nuclear power in 2013 (IESM 2014) to incentivize competitive power producers to gain a larger profit. Feed-in-tariff to solar power rescued Chinese manufacturers that suffered financial distress by the anti-dumping measures imposed by the United States, by providing them with an opportunity to exploit domestic markets. This measure helped them to enjoy scale effects, regaining competitive edge in domestic and international markets. The high and unified benchmark price turns nuclear power to be a profitable business, attracting coal powers to join in the business (Yang 2017).

In contrast, the Chinese government postponed policies and measures that would put additional burden on SOEs. A typical example is upgrading the quality of transport fuel that is indispensable for improving air pollution caused by automobile combustion. Despite the urgent need, the fuel economy has been given special attention, putting a disproportional burden on automobile manufactures, most of which were established by foreign manufacturers or joint companies. It was not until Zhou YongKang, the oil tycoon who had many years been in charge of the Ministry of Land and Resources was dismissed that the government enforced NOCs to improve the quality of transport fuel.

3.4 Fostering clean energy industries

The Chinese government reframed clean energies as new growth points to avoid climate-energy policy from restricting economic growth (Chen 2013). Faced with the trilemma among expansion of supply capacity, a structurally heavy reliance on coal and its inefficient use, and air pollution as depicted in chapter 1, the government regarded the development and use of clean energies, including renewables and nuclear as an inevitable choice for enhancing and diversifying energy supply, in addition to energy conservation (Denjean and Cassisa 2016). It initiated a national concession program for wind power in 2003 that guaranteed the purchase of power at the winning price in competitive biddings for large projects over 25 years. Large power generators were mandated to supply renewable electricity at 3 percent by 2010 and at 8 percent by 2020. It set out the target to increase nuclear energy production capacity fourfold by 2020 (NDRC 2007c).

In the process, the government takes several industrial policy measures, including: high local contents requirements in the concession that de facto excludes foreign developers, picking up winners through public biddings, financial supports and carefully designed technology transfer policies to foreign companies' production in China. As for wind turbine and components, the government imposed a 50 percent of local content requirement on the developers initially and raised the rate up to 70 percent in 2005 (Buen and Castro 2012). This prevented foreign developers from joining in the program because many foreign-owned companies did not establish China-based manufacturing facilities in their partnership with Chinese-owned companies to protect their know-how or intellectual property rights from being leaked to Chinese partners (Lewis 2007). In addition, it coordinated with state-owned banks to offer large financial and investment incentives to state-owned or state-connected enterprises (Hochstetler and Kostka 2015). This enabled Chinese state-owned manufacturers to offer lower prices in the selection process, winning bids, and take advantage of the scale of economics to lower the cost. In contrast, foreign manufactures are forced to play a minor role, sharing a few percent in the Chinese market (International Energy Agency 2015).

The clean development mechanism (CDM) provided additional financial support for the deployment of domestically manufactured wind power (Buen 2012). China hosted the largest number of CDM projects in the world, of which wind power shared 20 percent (Mori 2013). While CDM was assumed to use foreign technology, China employed domestic technology once the CDM Board admitted unilateral CDM under which a host country organizes and implements the project and sells the certified emissions reduction to developed countries and/or the international market.

Chinese state-owned wind turbine manufacturers successfully bypassed the export restriction clause in the license agreement with foreign companies. They acquired the latest technologies, production licenses, or concessions from those in advanced countries to develop production capacity (Horii 2014). To avoid fierce competitors in the world market, however, foreign companies required restrictive terms, for example, restricting or prohibiting export of the technology or offering licenses for only turbines below 1.5 MW capacity. To bypass the export restriction, Chinese SOEs acquired technology licenses from second-tier foreign manufacturers who had lost in the competition in the European market and had therefore been willing to sell licenses at a cheaper price (Mori 2015). They created join ventures with the top world manufacturers and made direct investment in foreign power plants to acquire latest technologies without any restriction, and to seek a subsequent easier market penetration for national production (Denjean and Cassisa 2016).

This conspicuous performance led to an outline of new and renewable energy development projects, placing them as priority projects as means of rural electrification. The Renewable Energy Act was enacted in 2006 to describes the duties of the government, businesses, and other users, including mandatory grid connection, price management regulation, differentiated pricing, special funds, and tax relief. The Medium- and Long-Term Development Plan for Renewable Energy was followed by setting the target share of renewable energy as a percentage of total primary energy consumption to 10 percent by 2010 and to 15 percent by 2020. These targets are succeeded in the 12th and 13th FPY by a national target to increase the share of non-fossil fuels in the primary energy supply to 11.4 percent and 15 percent, respectively (Table 3-1). Accordingly, the Renewable Energy 12th FYP outlined the targets for the share of renewable energy at 9.5 percent for primary energy consumption and at 20 percent for electricity generation.

In contrast, it was in kind support from local governments and financial support from the Chinese Development Bank (CDB) that fostered Chinese solar photovoltaic (PV) module and cell manufacturers. While the government initiated the same national concession program with a public bidding as wind power, it only benefitted SOEs that had little market competitiveness. It squeezed out private companies that had recruited skilled Chinese entrepreneurs from the Diaspora (De le Tour et al 2011) and obtained in kind support from local governments to dominate the domestic market (Zhang 2011). The CDB rescued them, proving large amount of subsidized loans to go out to foreign markets (Sanderson and Forsythe 2013). This enabled them to grow up rapidly, kicking first-tier German and the US manufacturers out of the market to dominate a lion's share of the world's market.

As for nuclear power reactor, the foreign company retains the property right of the Gen-II, the most common reactor in China. However, the official model for future home-built Gen-III reactor designs, the CAP 1400 will display Chinese intellectual property rights, despite being based on the model created by the foreign company (Denjean and Cassisa 2016).

3.5 Integration of health concern

Finally, the Chinese government adjusted its energy policy to more seriously address the worsening air pollution. Beginning in 2011, a thick cloud of air pollution spread not only from Beijing and Tianjin out to Hebei Province but also from the Yangtze River Delta and the Pearl

River Delta, which raised health concerns. By framing air pollution as an urgent health issue in compelling visual and intellectual terms, Chai Jing's 2015 104-minute documentary Under the Dome opened doors to behavioral and policy ramifications with transformative potential (Koehn, 2016). The health concerns became so immense as to shake the legitimacy of the government (Ren and Shou 2013). In response, the Chinese government identified the underlying causes as industrial coal combustion as well as exhaust from vehicles, outlining the target of the share of coal consumption at below 65 percent of total energy consumption by 2017. It issued the Action Plan on Prevention and Control of Air Pollution in 2013 to define countermeasures, including forced closure and/or inhibition of new small-scale commercial boilers, industrial plants in heavy industry, and non-utility power generation plants. It also restricted the use of high sulfur and ash coal in major cities and the long-distance transport of them. It released the Energy Development Strategy Action Plan (2014-2020) and the 2015-20 Action Plan on the Efficient Use of Coal to set the cap for primary energy consumption at 4.8 billion tons of standard coal equivalent (tce), the cap for coal consumption at 4.2 billion tce, and the share of coal as a percentage of primary energy consumption at 62 percent in 2020. It further revised the Air Pollution Control Act in 2015 to raise its maximum fine by a factor of 10 and mandated coal power to take countermeasures against nitro oxygen and mercury emissions, industrial plants to control emissions of volatile organic compounds, and automobile manufacturers to enhance fuel economy. These all resulted in more stringent targets in the Energy 13th FYP that outlines more ambitious targets: the share of coal as a percentage of total energy consumption to 58 percent, 4 percent below the Action Plan, and the generation capacity of wind and solar power at 210-250 GW and 110-150 GW, respectively, more than 10 GW higher than the Action Plan. The Chinese government announced an increase in natural gas power and ultra-super critical coal power in the 2016 congress to decrease the coal dependence to less than 50 percent. It also implemented coal consumption standards for power plants that will require 10 GW of inefficient coal plants to close and a further 350 GW of capacity to improve their operational efficiency (Climate Nexus 2015).

The National Plan for Tackling Climate Change (2014-2020) reflects this adjustment in energy policy: it expanded its scope of measures to include elimination of backward steel production capacity, development of the service sector, control of construction and transport emissions, and pilot demonstration projects as well as incentives and restraint mechanisms as key areas for mitigation actions. But it still sees GHG emissions reduction as co-benefits of its energy policy, which is to seek energy security and a reduction in health damage, instead of directly addressing GHG emissions reduction at the same time.

4. Achievements

Energy mix has been changed during the 12th FYP period. China has increased energy import up to 700 million tons of coal equivalent (tce) and to exceed 16 percent of energy consumption (Figure 1-1). Oil and gas import has been rapidly and massively increased since the Chinese government made a commitment to the GHG emissions reduction per GDP. The share of import oil reached 60 percent in 2014 up from 50 percent in 2008. Natural gas import jumped up and has been increasing since 2010 when China started to import liquefied natural gas (LNG) and pipeline gas (Figure 3-2). This brought CNPC more than 100 billion yuan of net profit and Sinopec and CNOOC more than 50 billion yuan during 2011-13 (Abe 2016). The revision to the Natural Gas Use Policy in 2012 encourages the use of natural gas in automobiles, residential buildings, and combined heat and power (CHP) and lifts the restriction on the use of natural gas for such high energy consuming industrial sectors as petrochemical, non-ferrous metal industries, and power plants, in accordance with the development of mainstream and branch pipelines. It promoted the energy switch from coal to natural gas in a short period of time, raising the share of natural gas consumption during the 12th FYP period (Table 3-1).

Meanwhile, coal and lignite has been increased since 2009 after import ban had been lifted (Figure 3-2), stimulated coal consumption. It is not until 2014 when import ban was revived that both coal import and consumption fell down (Figure 3-3). The successive decrease in coal consumption justifies the forced scrap of coal production capacity and reduction of production, and makes the target on a decrease in coal dependency in the 13th FYP period realistic. Nonetheless, its abrupt and harsh measures brought about coal prices hike in 2016, forcing it to increase coal production to cool the price down.

In addition, Chinese wind turbine manufactures have enhanced their competitive edge, rapidly increasing their share of world production to gain 30 percent in 2015 (REN21 2016). Chinese solar PV cells and modules manufactures dominate the world's production capacity and amounted to 60 percent during 2010-14 (International Energy Agency 2015). In 2015, China surpassed Germany in having the world's largest capacity for both wind and solar power generation, with 199 GW of renewable power capacity (REN21 2016). This massive deployment of wind and solar power enabled the Chinese government to increase its share of non-fossil fuel as a percentage of the primary energy consumption up to 12 percent in 2015, higher than the targets in the 12th FYP. Their achievements, which exceeded the targets, pushed the NDRC to describe a target of non-fossil fuel share of 20 percent in 2020 in the Energy Development Strategy Action Plan (2014-2020) and ambitious wind and solar power installation capacity targets in the 13th Energy FYP (Table 3-1).

However, such change in energy mix has only made a minor contribution to the CO_2 emission reduction. It has even pushed up the emissions in some provinces such as Heilongjiang (Xu et al.

2017) and several industries such as petroleum processing and coking (Jing et al. 2017b).

It is the energy intensity effect that has played a key role in mitigating CO_2 emissions (Xu et al. 2014). The effect becomes larger in the first half of the 12th FYP period (2011-13) than in the 11th FYP period (Jing et al. 2017a). However, it can hardly cancel out the economic expansion effect that dominantly drives it up in the 11th and the. This results in the smaller increase in CO_2 emission and decreases in the carbon intensity in the 12th FYP period (Table 3-1).

These observed achievements suggest that while China has shifted energy mix from coal to gas and renewables by increasing energy import and boosting renewable energy manufacturing, the shift has generated marginal effects on CO_2 emission reduction by 2013.

5. Underlying factors behind the sluggish

To advance the shift in energy mix to reduce CO_2 emission, as well as air pollution, the current energy-centered climate policy, or climate-energy policy and other related policies should be developed to transform the energy supply infrastructure system toward the one with low CO_2 emission. Given China's high coal dependency, it implies a decrease in coal consumption and switch to gas and renewable energy to keep supporting economic growth.

Such transformation crashes with the interests of regime actors. The central government's measures to rationalize the exploitation, use and transportation provoke conflicts with provinces' interests in their own coal industries. The government's commitment to limit coal production and to a decrease in the coal share is further damaging the industry, making 1.3 million workers redundant to relinquish the excess capacity (Fukushima 2016). The rapid installation of renewable energy capacity threatens their interests in their coal power. The local grids place a higher priority on the connection with coal power, especially combined heat and power (CHP) to secure stable supply of heating in winter. The central government's insufficient compensation and slow payment of feed-in-tariff for renewable energy discourage them from accepting these energies, and investing in transmission capacity to connect to the grid. This led to one-third of wind curtailment in the winter of 2010 (Davidson 2013). Despite its decrease in 2011-13 (Fang, Li and Wang 2012), it went down to reach 39 percent in the northeast and 32 percent in the northwest provinces in the winter of 2015 (World Nuclear Association 2016).

To address renewable curtailment, the central government requires top solar-producing provinces to increase their transmission capacities (RENS21 2016) and develops ultra-high-voltage (UHV) transmission network. However, it ignores interconnection among provincial grids that enable renewable energy to be integrated into the system without impairing reliability and investing in costly and lengthy transmission lines (Mori 2018). In addition, it suspends new wind power construction approvals and access to grid connections in the six top wind-producing provinces

(China Daily 2017). Provinces with high coal dependency impose charges or production restriction on renewable energy producers to protect their own coal power (Yang 2017).

Switching from coal power and CHP to gas power can reduce renewable curtailment, as gas power enhances load-following capabilities (Li 2013). However, it clashes with the interests of NOCs and regional major suppliers. The government imposes NOCs to sell imported gas under non-profitability conditions for fear of potential repercussion of residential consumers, most of which can hardly afford international price in energy (Romano, Yin and Zhang 2016). It also sets the differentiated prices according to the type of consumers, requiring cross-subsidize residential consumers. In exchange, NOCs and local are downstream suppliers are allowed monopolistic supply. In addition, insufficient development of transportation and distribution infrastructure limits carrying gas to major consumption areas of the east coastal cities. All of them make the domestic natural gas price the world's highest among major consumers such as industries and power plants (Paltsev and Zhang 2015; Bloomberg News 2017), discouraging them from switching to gas. The gas prices reform that links it to international price and third-party access to the pipeline network are implemented, although gradually, as measures to encourage investments in domestic unconventional sources and to increase decentralized energy production, accelerating the switch. However, both NOCs and local suppliers effectively block their participation to protect their control and monopoly (Liu et al. 2013).

This implies that China's energy supply system is so deeply embedded into local governments that protect local coalmines and coal power, large state coalmines and NOCs that the central government faces mounting difficulties to reconfigure it against their vested interests.

6. Reframing climate-energy policy

To mitigate fierce conflicts of interests among coal, gas and renewable energy suppliers, the Chinese government takes three actions. First, it revived coal tariff in 2014, which could protect local coalmines, in the name of air pollution control, together with restriction of the use of high sulfur and ash coal in major cities and long-distance transport (Wong 2014). Second, it accelerated the development of hydropower. Since the publication of the Renewable Energy Mid- to Long-term Plan, China has increased hydropower generation capacity by 165GW to reach 320GW in 2015. It includes not only small hydropower that are installed by capitalized on clean development mechanism (CDM), but also the ones located in the upstream of Mekong and Nu/Salween rivers, which provoked significant local opposition in China and downstream countries, for Chinese central government and local authorities took countermeasures to ecological disruption, displacement and loss of livelihood of local residents (Brown and Xu 2010).

Third, it reframes the climate-energy policy to link it with its official slogan of "going global." It applies the "common fate and destination" model that has been employed in its South-South development cooperation in the oil and gas contracts to state coalmines, coal power and hydropower companies. This model consists of host country's decision on large infrastructure development projects, establishment of a joint venture company with host country, international competitive bidding, mobilize financing through combining export buyer credits and non-concessional loans with no conditionality and no question on human rights, and services provision by the company that won the bid (Lin and Wang 2017: 180-2). The services can include actual labor in the form of workers and the intermediary goods when the project is implemented under an engineering, procurement, and construction (EPC) arrangement.

The reframing makes it easier for the central government to convince SOEs in these sectors and provinces that have interests to shut down small coalmines and plants, because SOEs can mobilize the workers in foreign energy development projects. It can also enable the government to enhance mutual dependency on foreign countries, lowering the risk of energy insecurity.

Host countries, in contrast, can suffer from this reframing. The "common fate and destination" model increases their dependency on China, not only as a main importer of their energy products, but also as a project developer and exporter of goods and services. It will gain higher economic and political power in host countries once joint venture companies that are set up by Chinese SOEs and influential local counterparts obtain concession for large infrastructure projects. Chinese SOEs can capitalize on the power to tame opposition against social and ecological damages caused by the projects. Finally, it will move the energy sector of host countries toward a high CO_2 emission pathway and intensifies its institutional lock-in.

7. Conclusion

This chapter serves as a critical review of China's climate policy. The findings are summarized as follows.

This chapter aims to explore what changed China7s initial hostile stance toward proactive one. To answer this question, it revisits the policy process and policy outcomes that the Chinese government has taken to address the climate-energy conundrum, discussing the effectiveness of the policy outcome and logical consequences that will cause by enhancing the outcome.

The findings can be summarized as follows. First, China's climate policy has been centered on energy development strategy, thus framed as energy policy. However, detailed policy measures have been adjusted to incorporate vested interests of local governments and national oil companies (NOCs), government desire to create new growth point, and emerging heath concerns into account to make it realistic and effective.

Second, the resultant climate-energy policy provokes conflicts of interests among provincial governments, NOCs and distributed energy producers. This is the underlying cause that blocks changes in energy mix from accelerating, and impairing the structural effect in CO_2 emission reduction.

Finally, such domestic conflicts of interests are too fierce for the government to find an east solution. This makes the government shift its focus toward "going global" of coal and hydropower industries. However it can cause international disruption of livelihood and ecology, and directs the energy infrastructure system of foreign countries toward a high CO_2 emission pathway.

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[Note]

[1] According to the World Bank's World DataBank, China's foreign reserve surpassed US$ 1 trillion in 2006 and reached 3.9 trillion in 2014.

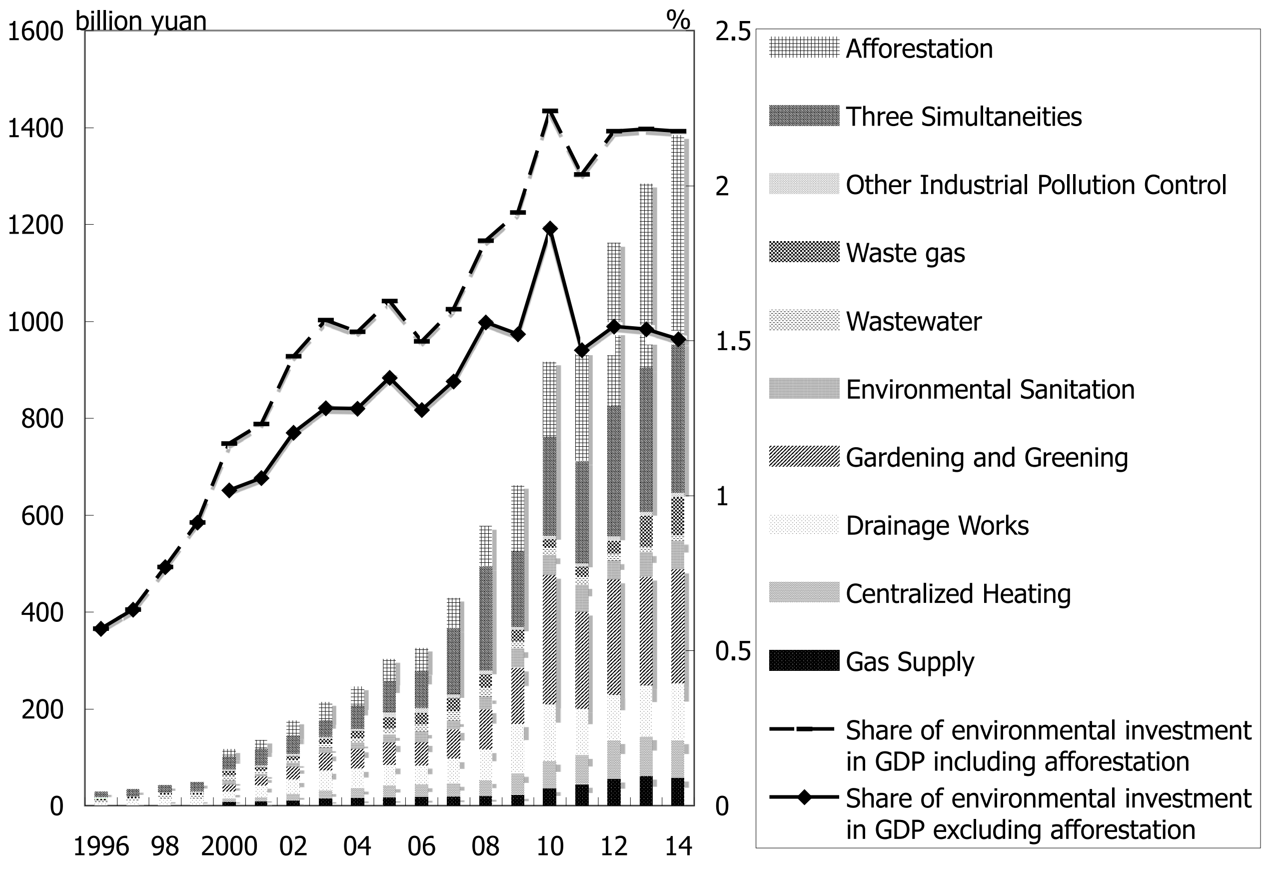

Figure 3.1 Environmental protection and afforestation investment in China 1996-2015

Source: Author compilation based on China Statistical Press, *China Statistical Yearbook on Environment 2000; 2015*; and *China Statistical Yearbook 2015*.

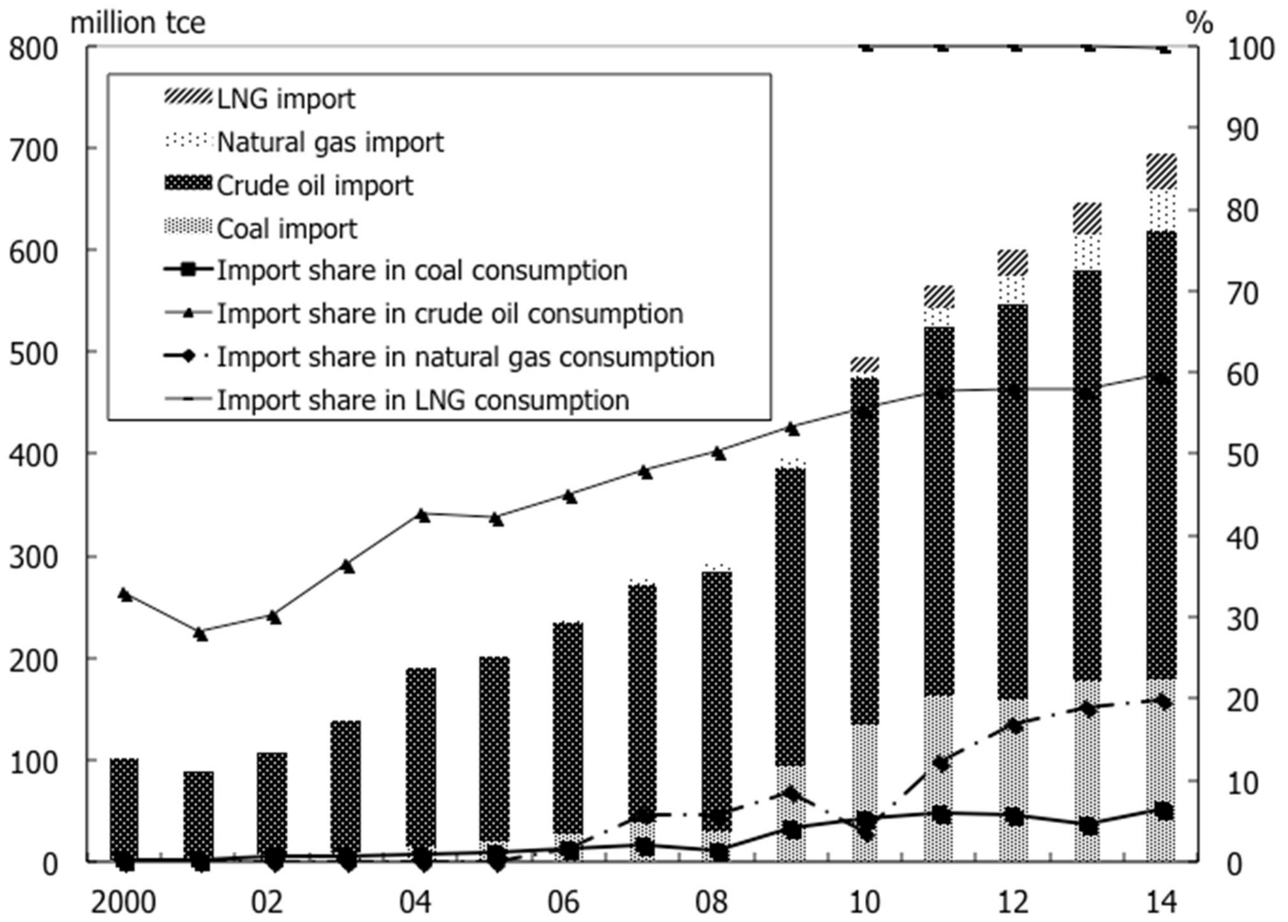

Figure 3.2 China's energy import and share in consumption by source

Source: Author compilation based on *China Energy Statistics Yearbook 2009; 2014; 2015*.

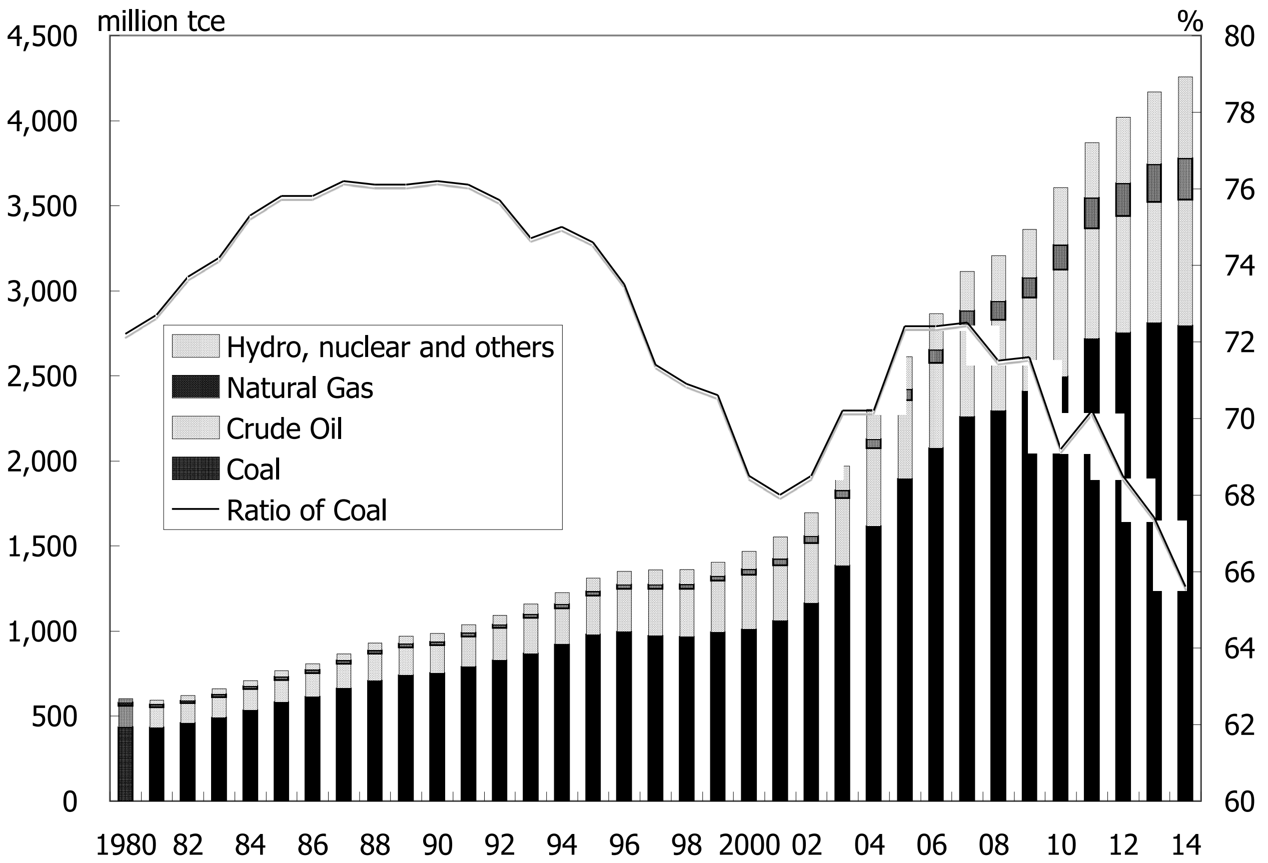

Figure 3.3 Energy consumption in China by source 1980-2014

Source: Author compilation based on China Statistics Press, *China Energy Statistical Yearbook, 2015*.

Table 3.1 China's energy, CO_2 emission and environmental performances

	9th FYP	10th FYP (2001-5)		11th FYP (2006-10)		12th FYP (2011-5)		13th FYP (2016-20)
	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan
Carbon intensity	-26%	-	7%	-	-14%	-17%	-20%	-18%
Carbon emission [a]	9.8%		68.7%		45.0%		18.3%	
Carbon emission [b]	3.7%		6.2%		9.1%		10.7%	
Energy Consumption (Gtce)	1.47	-	2.61	-	3.6	4.0	4.3	5.0
Coal Consumption (Gt)	1.36	-	2.43	-	3.49	-	3.96	< 4.1
Energy Intensity	-	-	-	-20%	-19.1%	-16%	-18.2%	-15%
Coal in primary energy consumption	68.5%	-	72.4%	-	69.2%	-	64%	58%
Natural gas in primary energy consumption	2.2%	-	2.4%	-	4.0%	8.0%	5.9%	10%
Non-fossil fuel in primary energy consumption (%)	-	-	-	-	8.3%	11.4%	12%	15%
Sulfur emission	-	-10%	27.8%	-10%	-14.3%	-8%	-18%	-15%
Nitrogen emission	-	-	-	-	-	-10%	-18.6%	-15%
Wind (GW)		-	1.056	8	31	100	145	210-250
Solar (GW)		-	0.07	0.07	0.86	21	43.5	110-150
Hydro (GW)	79	-	117	-	220	290	319	340
Nuclear (GW)			0.684		10.8	40	26	58
Coal (GW)					660	960	990	< 1100
Natural Gas (GW)					26.4	56		110

Note a: Olivier et al. (2016).

Source: Author compilation based on NDRC (2007b, 2012), Ministry of Environmental Protection (2016), and World Nuclear Association (2016).